THE INSTITUTE OF PETROLEUM REVIEW

V. 14 #159

March 1960

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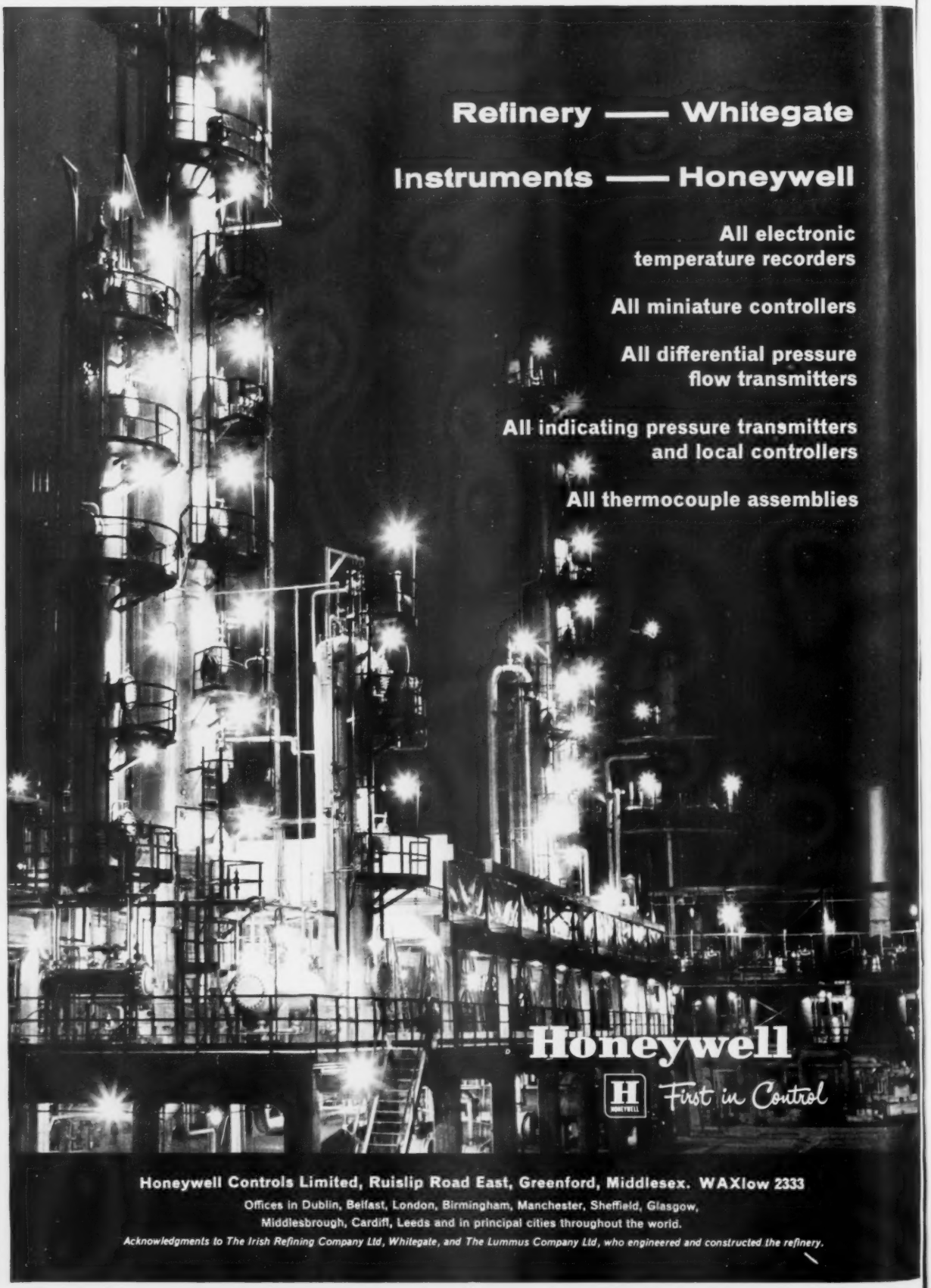
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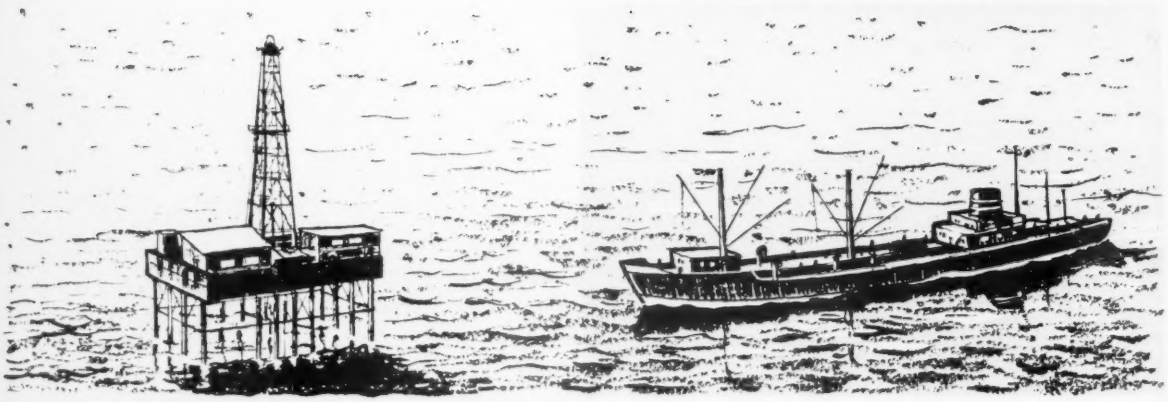

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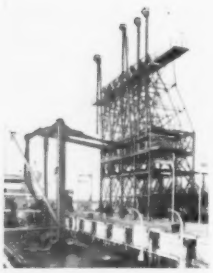

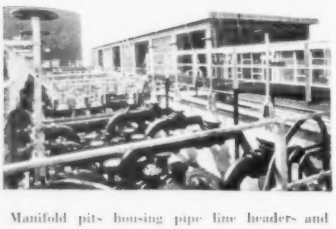

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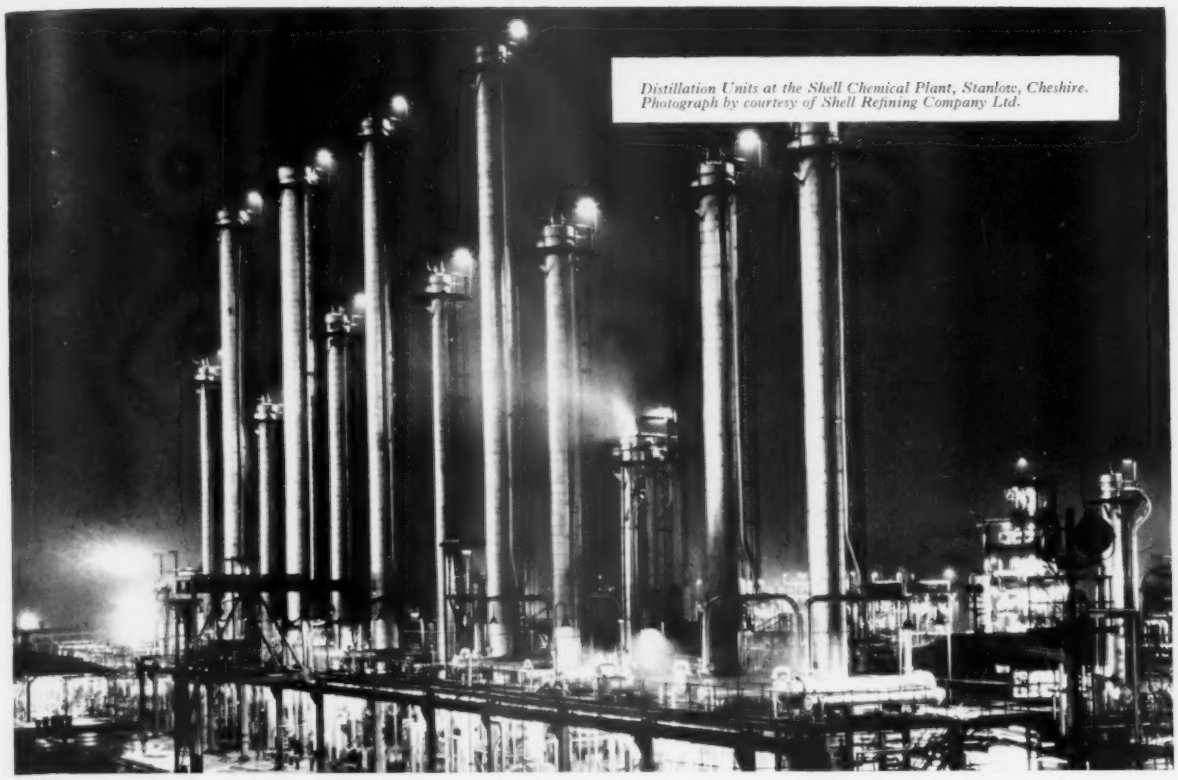

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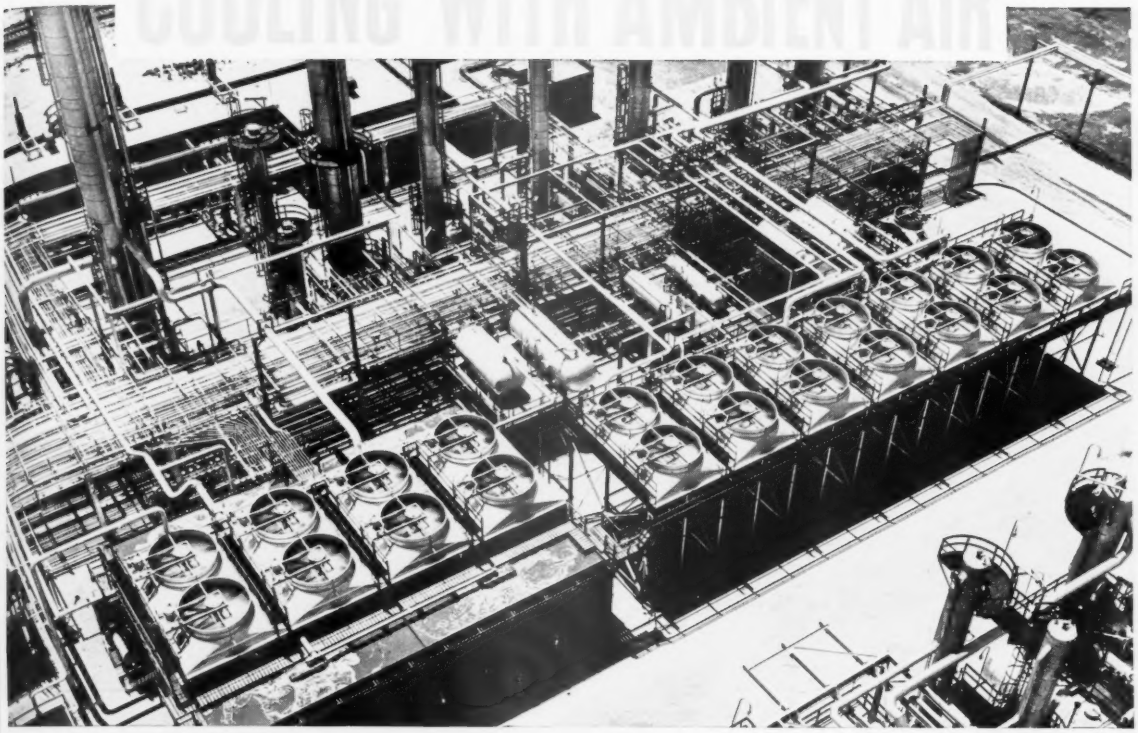

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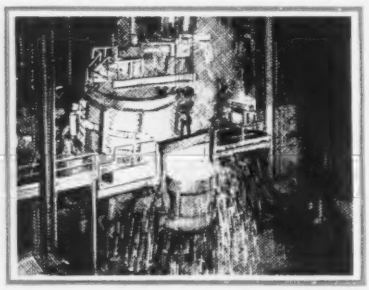

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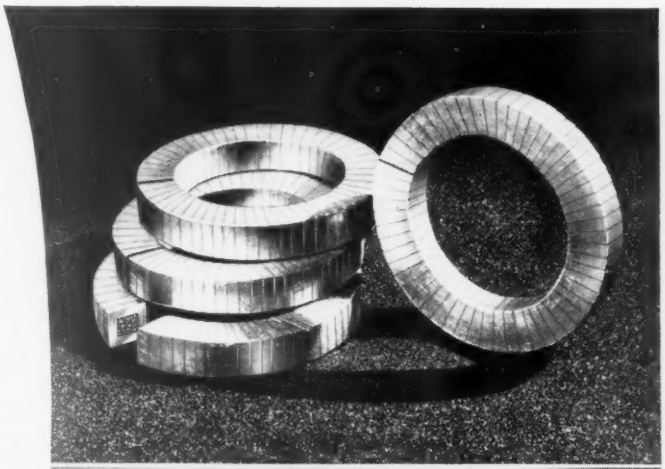

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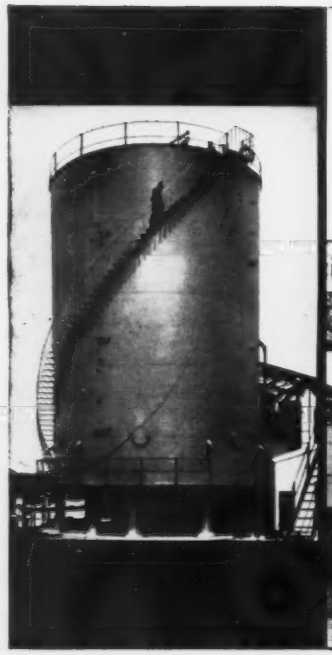

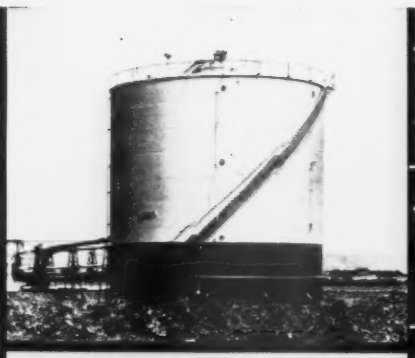

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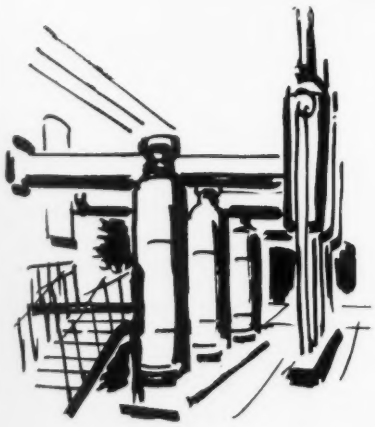

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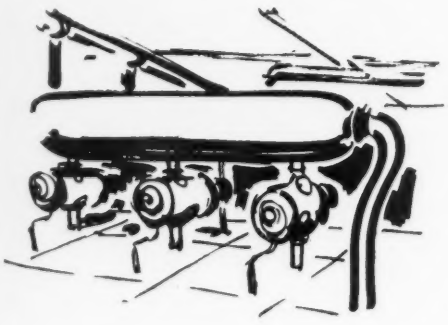

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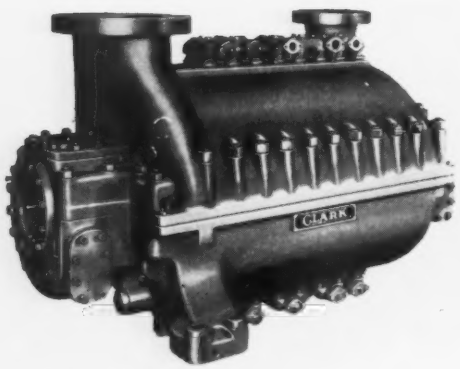

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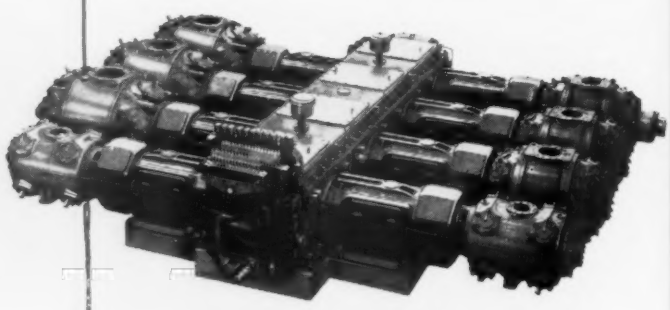

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*Additives for Lubricants**

By G. H. THORNLEY†

In 1955 rather more than one and a quarter million tons of lubricating oil additives were manufactured, and presumably sold. In 1956, the total rose to 1,350,000 tons, and the estimate for 1960 is rather more than one and a half million tons. These quantities can be roughly estimated as to approximately 50 per cent detergents, 25 per cent viscosity index improvers, and 11 per cent anti-oxidants; pour point depressants, extreme pressure lubricant additives, oiliness additives and the like, totalling together about 14 per cent.

Additives are put into lubricating oils for a great variety of purposes. The oil in the internal combustion engine has principally to do two things—to reduce friction, and to carry away heat. To do this it is churned through the oil pump, pushed through narrow passages under pressure, sprayed out of the ends of bearings in fine mist, and spread in thin films on hot metal. Heat and flame and oxidizing gases assail it; it is contaminated with soot, aldehydes, gaseous and liquid acids, steam and liquid water, and from petrol engines using leaded fuel, chlorine, bromine, and lead compounds. It must present an incorruptible front to these assaults. Therefore its stability is very important, and additives do a great deal to improve the stability of the petroleum which nature and the refiner produce.

Anti-oxidants help to prevent chemical deterioration of the oil. Detergents combat the evil effect of solid decomposition products from fuel and lubricant. Viscosity index improvers alleviate the physical effect of temperature change on viscosity. Pour point depressants prevent solidification due to inter-locking of wax crystals when the oil is cooled.

Anti-oxidants

Anti-oxidants are oil soluble organic compounds or metallo-organic compounds of four principal types. First, sulphur compounds: sulphurized esters, sulphurized terpenes and olefins, aryl and alkyl phenol sulphides, and metallo dithio-carbonates. Second, phosphorus compounds: alkyl or aryl phosphites, or the naturally occurring compound lecithin. Third, sulphur and phosphorus compounds: metal salts of dithio-phosphoric acids made by reacting alcohols with phosphorus pentasulphide, or reaction products of terpenes with phosphorus sesquisulphide. Fourth, amines and phenolic compounds—which are not very useful in internal combustion engine oils where high temperatures prevail, but are very good anti-oxidants for moderate temperature work.

The well known oiliness characteristics of castor oil are particularly useful for racing engines, and for lubrication of worm-gearing, and other highly-stressed machinery, but uninhibited castor oil is easily oxidized, and its oxidation products readily polymerize into undesirable gums and other solid products. A suitable combination of anti-oxidants can effect most spectacular improvement in resistance of castor oil to oxidation and gum formation.

A great variety of laboratory tests to evaluate these anti-oxidants have been devised over the last thirty or forty years, but they are not entirely adequate, and we are forced to more expensive engine tests, such as the L-4 Chevrolet test which was devised in the United States about 1940 and has held sway in official specifications ever since. It uses a 6-cylinder engine and is, therefore relatively expensive to run, so endeavours are made to find a simpler engine which will operate at less cost. In the United States the Co-ordinating Research Council, Co-operative Lubricants Research Section, has, after a great deal of co-operative work between engine manufacturers and the petroleum industry, brought out the CLR (Co-operative Lubricants Research) engine, which is intended to replace the Chevrolet. This is a single-cylinder, robust engine, designed specifically for lubricants testing, for ease of assembly and disassembly, for flexibility, and for ability to hold constant operating conditions.

The proposed test procedure for the CLR engine is known as the L-38 procedure and is shown in Table I.

In the United States the CLR engine was devised purely as an oil test engine, whereas Britain, co-operatively, took an existing engine already in production and fairly cheap to buy, made certain modifications to it, and set up a procedure as shown in Table II. The Engine Testing of Lubricants Panel of the IP Standardization Committee carried out co-operative research with a view to finding a procedure with the Petter W-1 engine to replace the Chevrolet at much lower initial and test running costs.

* Based on a paper read at a meeting of the IP London Branch in February 1958.

† C. C. Wakefield & Co. Ltd.

TABLE I

CLR OIL TEST ENGINE

L-38 Procedure

Test duration, hours	40
Speed, rev/min	3150 ± 25
Load, bhp	5·0 approx
Fuel	PE IP L-4 Ref. gasoline
Fuel consumption, lb/hr	4·5 – 5·0
Air fuel ratio	14·0 – 0·5
Intake air temp, F	80 min
Jacket outlet temp, F	200 ± 2
Outlet temp above inlet temp, F	10 ± 1
Oil gallery temp, F	280 ± 2 (SAE 10 – 265 ± 2)
Spark advance btdc	35 ± 1
Oil pressure, psi	40 ± 2
Crankcase vacuum, inches water	2 ± 0·5
Exhaust back pressure, inches mercury	0·1

In the 36-hour Chevrolet L-4 test with an oil sump temperature of 280 F, most mineral oils will give lacquered pistons with stuck rings and connecting rod bearing weight losses of over 1000mg. Additive treated oils of DEF.2101 quality give clean pistons with free rings and bearing weight losses below 200mg, and often well below 100mg. The value of oxidation inhibitors in reducing bearing weight loss caused by oil oxidation products is shown by the fact that a bearing weight loss of the order of 2000mg can be reduced to less than 50 by the addition of little more than 0·5 per cent of a suitable anti-oxidant to the oil.

Very similar comparative results are obtained from the Petter W-1 test and correlation with the L-4 test may well be a possibility.

TABLE II

PETTER W-1 OXIDATION TEST PROCEDURE

Operating time, hours	36
Speed, rev/min	1500 ± 15
Load, bhp	3·3 approx
Oil pressure, psi	8 ± 3
Oil temperature:	
SAE 20, 30, 40, and 50, F	280 ± 2
SAE 10, F	266 ± 2
Coolant temperature inlet, F	299 ± 4
Coolant temperature outlet, F	302 ± 2
Hot-spot heater plate temp, F	392 ± 9
Spark advance, btdc	20 ± 1
Oil capacity, pints	2
Fuel	PE IP L-4 Ref. gasoline
Fuel flow	45·2 sec for 20 ml ± 0·5 sec

Detergents

Having dealt briefly with anti-oxidants, we come to detergents, or detergent-dispersant additives. These come in many varieties. Invariably there is a metal, calcium, barium, magnesium, aluminium, or tin with a coupling group, sulphonate, hydroxyl, carboxyl, or mercaptan between the metal and the organic component. There is generally in the structure a high molecular weight, straight or branched paraffin chain, or aromatic or naphthene rings to promote oil solubility. These detergent additives can be over-based, or made basic. This can be done by taking, for example, a barium petroleum sulphonate, incorporating more barium into the compound than the neutral barium petroleum sulphonate formula requires. This extra basicity is of value in combating the evil effects of sulphur acids from the combustion of high sulphur fuels in compression ignition engines The detergent additives are quite often pro-oxidants in themselves, so that they are almost invariably used in conjunction with anti-oxidants.

For testing for detergency in the laboratory, tests can be conducted with suspensions of carbon black, examining the degree of dispersion with dispersant additives, but it is imperative to do engine tests, and the well-known Caterpillar L-1 test, which forms part of military and other specifications all over the world, is that most generally used. It is a 480-hr test with an expensive engine. The Caterpillar L-1 test forms part of DEF-2101, the US MIL-L-2104A, and other official specifications. Fuel of minimum sulphur content 0·35 per cent is used in this test. If the test is similarly carried out, but with fuel of 1 per cent sulphur content, we get what is known as the Supplement 1 test, and a distinctly superior degree of detergency is required to cope with the higher sulphur content of the fuel. For the Caterpillar Company's requirements, the Series 2 oil again uses the Caterpillar 480-hr test and a 1 per cent sulphur fuel, but with a supercharged engine, which makes conditions in the piston ring area much more arduous and requires a higher degree of detergency. The Caterpillar Company now specify a Series 3 oil, for which an even higher degree of supercharging makes conditions much worse, and again, more additive is required.

Naturally, therefore, people have looked for smaller engines with tests of shorter duration, to save cost. Examples are the Lauson engine, and the Petter AV-1. Lauson and Petter AV-1 engine test procedures have been devised which rate oils in somewhat similar order to the Caterpillar L-1 procedure, but the correlation is still far from complete.

The mechanism of detergency—keeping engines clean by suspending or peptizing sludge—is a mainly physical action, but there is probably a chemical effect also. The chemical action of over-based detergents in neutralizing sulphur acids from the combustion of high sulphur fuel has been mentioned, but in addition there is oxidation of hydrocarbons producing oxygenated acids from either the fuel or the lubricant. These acids have a limited solubility in mineral oils, and are liable to polymerize in the hotter parts of the engine to form lacquer and carbonaceous deposits.

The metallic salts used as detergent additives may be considered basic towards the oxygenated acids, so that a reaction occurs forming a complex oxy-acid, for example naphthenate or sulphonate salt, which is oil-soluble and does not readily polymerize. Many detergent additives increase the foaming tendency of oils, and it is fortunate that anti-foam additives are available which completely overcome this defect.

Additives for Low Temperature Conditions

So far consideration has been given to internal combustion engine oil additives for high-temperature operation, but for low-temperature conditions the problems are quite different. Dr C. G. Williams was the first to propound, more than twenty years ago, the corrosive theory of cylinder

TABLE III

FL-2 PROCEDURE

Engine	Chevrolet
Operating time (total), hours	40
Speed, rev/min	2500 ± 25
Load, bhp	45 ± 1
Coolant outlet temp, F	100 ± 5
Coolant inlet temp, F	90 ± 2
Sump oil temp, F	165 ± 5
Air/fuel ratio	14·5 ± 0·5/1
Initial oil fill, lb	7½
Oil make up	At 20 hours

wear, which is now universally accepted: that at any temperatures below about 55°—60° C in the combustion chamber there will be condensation of water of combustion. In addition to the fact that the combustion of a gallon of petrol produces rather more than a gallon of water, there are carbon, sulphur, and nitrogen oxides which, in the presence of water, form corrosive acids. Oils tend to be thick when they are cold, so in cold starting there is the lowest rate of oil circulation when it needs the quickest rate to cover the surfaces and protect them, either by neutralizing acids or by laying down protective films which will prevent the aqueous corrosive media from making contact with the metal surfaces. In addition, cold starting requires a rich fuel/air ratio, giving sooty combustion. The cold aluminium piston is not as big as it ought to be under running conditions, so there is blow-by, and thus cold sludge is found in the cooler parts of the engine. This is the black mayonnaise type of water-in-oil emulsion. It may be clean water and clean oil, forming a water-in-oil emulsion stabilized by soot from the combustion.

A great deal of research has been put into the problem of controlling low-temperature cylinder wear and formation of cold sludge. Again, engine tests are necessary, and a great variety have been devised. Much co-operative work has been done in the United States on low-temperature operation of engine tests. The FL-2 procedure (Table III) is now some years old, but the test is largely discredited for evaluating lubricants. It is said to be good for evaluating the dirtiness of fuels in low temperature operating conditions.

The Ex-2 procedure (Table IV) was co-operatively developed in the United States to try and overcome the disadvantages of the FL-2. Certain modifications were made to the engine; rocker-cover vents welded shut, to reduce the ventilation and give more chance for water condensation to produce cold sludge; vertical notches in the compression rings to permit more blow-by; and a cycling load and speed procedure was used. It was not successful and the Co-operative Lubricants Research Committee went to work again, and are now devising an Ex-3 procedure. These things show how difficult is the problem of evaluating oils and additives to cope with the difficult low temperature conditions.

In addition to those two American projects, there have been some efforts made in the U.K., where a little single-cylinder Lauson engine was used, instead of a 6-cylinder Chevrolet, and the Lauson CW procedure was devised (Table V). It is a cycling procedure, with low speed, followed by high speed with a very low coolant temperature.

TABLE IV

THE EX-2 PROCEDURE

Engine ... ... Chevrolet (as for FL-2)

Modifications to standard engine:

1. Rocker cover vents welded shut.
2. 4 vertical notches in top compression rings 0·125 inch wide × 0·009 inch deep.
   Narrow slot (1/32 inch) oil rings in pistons 1, 3, and 5.
   All lands chamfered.

Operating time (total) ... ... 96 hours

Details of cycle	*Time, hours*	*Speed, rev/min*	*Load, bhp*	*Coolant outlet temp, °F*	*Oil temp, °F*	*Air/fuel ratio*
Part I	2	500	Nil	125	Not controlled (125 app.)	9-1
Part II	2	2500	45	95	165	14·5-1
Part III	2	2500	45	200	245	14·5-1

Initial oil fill ... ... 7½ lb
Oil make up ... ... Every 12 hours

TABLE V

LAUSON CW PROCEDURE A

Engine ... ... Lauson H2
Operating time (total) ... 90 or 120 hours

Details of cycle	*Time, min*	*Speed, rev/min*	*Load, bhp*	*Coolant outlet temp, °F*	*Sump oil temp, °F*
Condition A	15	700	Idle	Not controlled	Not controlled*
Condition B	5	2400	4·0	60·65	70·90

The engine is run in 10-hour periods with conditions A and B alternating as shown. Rings are weighed every 30 hours.

Initial oil fill ... ... 2 lb
Oil make up ... ... Every 10 hours

* *Note.*—Temperatures settle a few degrees below those at Condition B.

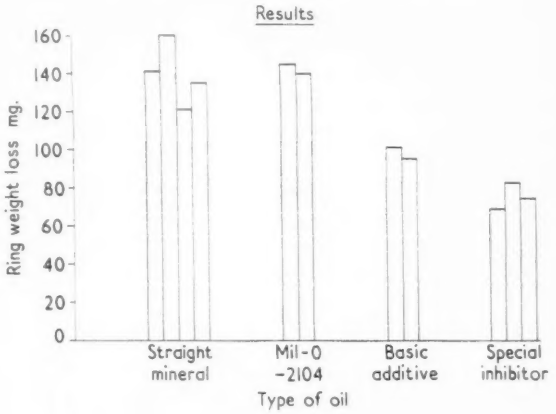

Fig 1

Fig 1 shows the effect of additives on piston ring weight loss, a measure of low temperature wear in that procedure. There is a very high weight loss with the straight mineral oil; the ML-2104 oil is not much better. The basic additive effects some improvement, and a special basic additive is a little better still.

Fig 2 reveals ring wear in mg/hr from a large number of tests. These are averages, and they show the evil effect of low jacket temperature, and the very good effect of high jacket temperature. It is seen that between 2½ and 6 mg/hr can be lost off the piston rings with a 60° F jacket temperature,

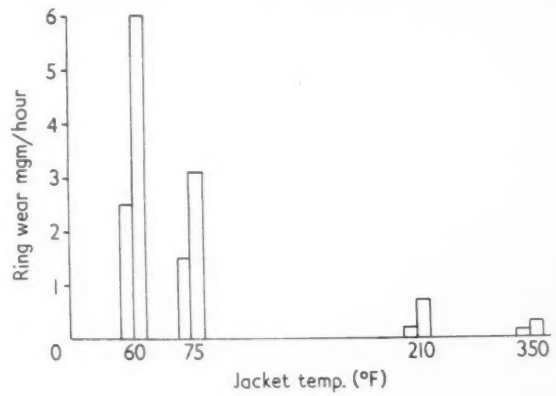

Fig 2

Fig 3

down to almost nothing at 350 F. What the lubricant is bothered with is cold, not heat.

In this 60 jacket temperature series of tests, a peculiar effect was found—that is, piston skirt corrosion. *Fig* 3 shows a corroded piston from that low-temperature work, and a similar piston using an additive in an attempt to combat that effect. As is usually the case with tests when using accelerated conditions to try to get results quickly, peculiar effects arise. This corroded piston effect has been seen about three times in the last thirty years from vehicles in service, so its incidence is entirely negligible. However, it is found every time with straight mineral oil in the Lauson test, with the jacket temperature at about 60 F. The question is whether the conditions have been accelerated by this cold jacket so much that the test is no longer of value.

Not being entirely satisfied with the Lauson results mentioned, a procedure (Table VI) was devised with a 10-hp Austin engine. The ring gaps were increased, an oversized jet fitted to give rich mixture, and a cycling procedure using low speed-low load and high speed-high load, followed every nine hours by one hour shut down with the cold water circulating to get static condensation in the engine. Some results were obtained from those tests (Table VII), but they did not tell a great deal about sludge.

However, it can be seen that it is possible to bring down

TABLE VI

AUSTIN AC/8 PROCEDURE

Engine ... ... Austin

Modifications to engine:

1. Compression ring gaps increased to 0·030 inch.
2. Oversize idling jet fitted to give rich mixture.

Actual operating time (total) ... 153 hours (17 cycles)

Details of cycle	*Time, hours*	*Speed, rev/min*	*Load, bhp*	*Coolant outlet temp, °F*	*Oil temp, °F*	*Sump Cooling Fan*
Condition A	1	750	Idle	90–95	Not controlled (90 app.)	Full on
Condition B	1	2000	10	125 ± 2	160 ± 2	As required
Condition C	1	Shut down	Coolant circulating			Full on

A complete cycle consists of 9 hours running alternately at conditions A and B followed by 1 hour at condition C thus—ABABABABC.

Initial oil fill ... ... $6\frac{3}{4}$ lb

Oil make up ... ... Every complete cycle

the rate of bore wear very considerably and to get nearly two more marks in the matter of sludge, which is a great help.

TABLE VII

LOW TEMPERATURE WEAR AND SLUDGE TESTS
AUSTIN AC/8 PROCEDURE. 17 CYCLES
Total 156 hours

	Reference oil ET/137/55 Anti-oxidant mildly detergent	*Special oil ET/9/56 Anti-oxidant Anti-corrosive*
Total sludge rating max. 60...	33·9	35·8
Mean max. wear all bores —10–4 inches	3·9	0·8

As has been said, a great deal of work is going on in the United States and Europe to find the answers to the evil effects of low temperature operation, and this is particularly important in the United States because the competitive state of their motor manufacturing industry causes them to build bigger and bigger engines of higher and higher horsepower, which they cannot use. The consequence is that 90 per cent of U.S. cars may be operating at the highest speed that the road conditions will permit, but the engines are only idling, so the evils of low temperature operation are with them much more than they are in the U.K. with its smaller high revving engines.

However, results are being reported from all this work, and new organic compounds containing phosphorus and sulphur have given promising results, and good performance has been reported on nitrogen-containing polymers, alkyl amino alkyl methacrylates which combine viscosity index improving and sludge dispersant properties.

The Patent literature has recently mentioned a co-polymer of dodecyl methacrylate and ethanolamine methacrylate, a co-polymer of alpha octadecene and acrylonitrile and a tri-polymer of palm kernel fumarate vinyl acetate and acrylonitrile. There is much activity in this field!

Viscosity Index Improvers

All oils become thicker when cooled, and thinner when hot. But the difficulty can be alleviated by the use of viscosity index improvers, which are all polymers from either *iso*-butene, methacrylate esters, or styrene. They are not readily soluble in cold oil, and apparently exist therein in a kind of colloidal suspension with the long chain polymer curled up, but when the oil is heated the long chain polymer straightens out and goes into complete solution, whereby it has a substantially greater thickening effect on the oil, and thus the viscosity index is improved.

With these polymeric viscosity index improvers, it is possible to make multi-grade oils. Great advantages are claimed for these, such as ease of starting when cold, quick circulation of oil from cold start, reduced fuel consumption, lower octane rating requirement increase, and no increase in oil consumption. Those are the claims, and to a considerable extent, well-founded, although it must not be thought, of course, that large-scale use of viscosity index improvers will solve all these problems. The ease of starting from cold, the quick circulation from a cold start, and the reduced fuel consumption, all depend upon low viscosity at cold starting temperatures. The *ASTM Handbook*

recommends that the viscosity at low temperatures should be ascertained by extrapolation on the ASTM Viscosity Temperature Chart from viscosities determined at, usually, 100 and 210 F. The ASTM Viscosity Temperature Chart is all very well for Newtonian fluids, but oils containing viscosity index improvers cease to be Newtonian fluids at temperatures of the order of 40, 50, or 60F, and if the viscosity at 32 F or zero is required, extrapolation on the ASTM Chart is probably quite misleading. The true viscosity of the oil at those low temperatures will be higher than the extrapolation indicates.

The actual determined viscosity at low temperature depends on the rate of shear in the instrument used for the viscosity determination, but only at the very high rates of shear will the true viscosity coincide with that on the extrapolated curve. This is a very complex subject, and it has been discussed at length in the relevant literature, with widely divergent views from the experts on both sides.

The viscosities of oils containing viscosity index improvers are, as has been said, reduced by shearing stresses. Viscosity index improvers vary in their shear stability, and it is important to ensure that the finished oil will not suffer an unacceptable loss of viscosity under the shearing stresses imposed in service. Shear stability depends on molecular weight and structure of the polymer, and its concentration. In general, the higher the molecular weight, the lower the shear stability.

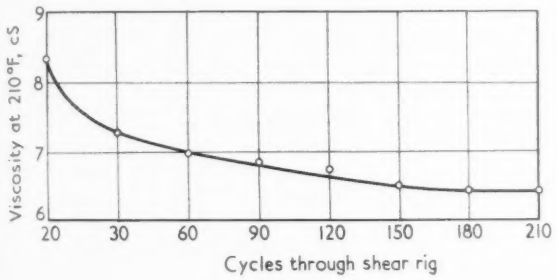

Fig 4

It is not easy to measure shear stability accurately. One method which is reasonably useful measures loss of viscosity due to cycling the oil through a diesel fuel injector nozzle. More recently, ultrasonic vibration in sonic oscillators has given promising results, with much reduced time taken for testing.

Fig 4 indicates the effect of shear upon viscosity. It is clear that the viscosity falls off fairly rapidly with increasing numbers of cycles through the shearing equipment.

Fig 5 shows theoretical curves to illustrate some of the difficulties of evaluating shear stability from the practical and economic points of view. Curve "a" represents an oil containing a viscosity index improver of fairly low m.w., "c" represents an oil containing a high m.w. polymer, and "b" a type intermediate between "a" and "c". How long should the shear test be run? If stopped at the point "x", oil "a" is infinitely better than oils "b" and "c", but if continued to point "z" all are approximately equal. The answer is to run the oils in representative engines, preferably driven by a motor to avoid fuel dilution and oil oxidation effects. After a period representing a suitable road mileage, the practical effect of engine shearing stresses on viscosity can be determined.

Lower octane rating requirement increase may require a little explanation. The car manufacturer wishes to design his engine with a compression ratio as high as the octane rating of the available petrol will allow, but the tendency towards pinking, and therefore the octane rating requirement, increases during the first few thousand miles of driving because of formation of deposits in the combustion chamber. Low viscosity solvent refined neutral oils thickened with suitable polymers, which raise both viscosity and viscosity index, have less tendency to formation of deposits on piston heads and cylinder heads than similar oils thickened with bright stocks. Therefore they have an advantage from the point of octane rating requirement increase. But it is not an unmixed blessing, because some, at least, of these polymeric thickeners give rise to increased piston ring groove deposits, especially in compression ignition engines, and much larger amounts of detergent additives have to be used to control this effect.

No increase in oil consumption is a controversial claim, and it has been discussed from all sides by the experts. Much more study of this subject is needed, but oil consumption is influenced by so many variables that the most careful analysis of results from engines is required before valid conclusions can be drawn. One thing is certain, and that is the higher the concentration of viscosity index improver, the lower the viscosity of the base oil, and the lower the viscosity of the base oil the higher the volatility, and that may become an adverse factor in oil consumption, when high temperature operation is considered.

Pour Point Depressants

These have been known and widely used for many years; many compounds have been patented, but the types most commonly used are paraffin wax aromatic condensation products, or polymerized methacrylate esters. They appear to have the property of coating the wax crystals and preventing their coalescence as they begin to separate from the cooled oil, so instead of a matrix of interlocking needle-shaped crystals, there are small non-adherent particles of wax suspended in the fluid oil. The reduced pour point obtained by the use of pour point depressants is not necessarily stable in certain conditions of cyclic temperature change, and in some cases the pour point may revert nearly to that of the untreated oil in such conditions. But in recent years pour point depressants have been vastly improved in respect of their ability to prevent pour point reversion, and refiners have contributed by more efficient dewaxing.

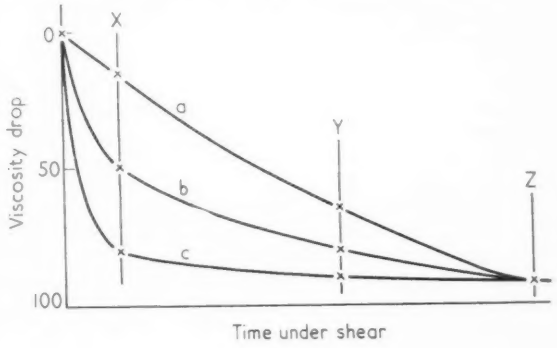

Fig 5

(To be concluded)

Institute Awards

The President handing the Redwood Medal to A. C. Hartley

There have been two presentations of Institute of Petroleum awards during recent months. On 16 December 1959 the Redwood Medal was presented to A. C. Hartley, C.B.E., B.Sc(Eng), F.C.G.I., and on 6 January the Honorary Fellowship of the Institute was presented to John A. Oriel, C.B.E., M.C., M.A., B.Sc.

THE REDWOOD MEDAL AND LECTURE

When he invited Mr Hartley to accept the Redwood Medal, C. M. Vignoles, C.B.E., the president, said that the Redwood Medal was awarded "as and when desirable to a petroleum technologist of outstanding eminence". Mr Hartley was the eleventh recipient of the medal, which was first introduced in 1921 in honour of the founder-president, Sir Boverton Redwood, and was eminently qualified to receive it. The Redwood Lecture, which they had just heard, made this all the more obvious.

Mr Hartley's first association with the petroleum industry was in 1924, when he joined the then Anglo-Persian Oil Company, now The British Petroleum Company, and in 1925 was appointed assistant manager of the Engineering Department and later in the same year assistant manager of the Supply Department. His first visit to Persia was in 1926 and he went there again in 1931 when he deputized for the assistant manager (technical). When in London he undertook the duties of chief engineer, and in 1932 was seconded to the Iraq Petroleum Company for work on the design and development of the pipelines from the Kirkuk oilfield to the Mediterranean shore. In 1934 he returned to the then Anglo-Iranian Oil Company and held the position of chief engineer until he retired at the end of 1950.

Since retiring from the Anglo-Iranian Oil Company, Mr Hartley had been in private practice as a consultant and was also a director of several companies.

While with the Anglo-Iranian Oil Company during the period 1940-1941 Mr Hartley was released for work on the development and production of an automatic bomb-sight which was designed at the Royal Aircraft Establishment at Farnborough. From April 1942 he was engaged with the petroleum division of the Ministry of Fuel and Power where he performed notable work in connexion with the PLUTO pipelines in carrying petroleum across the channel to the allied forces. In October 1942 he was also technical director of the Petroleum Warfare Department and in that sphere dealt with the FIDO fog-clearance scheme for use on airfields, and also with the development of flame weapons.

In more recent years, and in association with Rendel Palmer and Tritton, Mr Hartley had been the representative of the National Iranian Oil Company in connexion with pipelines for the transport of petroleum products from Abadan to Tehran and to Isfahan.

For his wartime activities Mr Hartley was awarded the C.B.E. in 1944 and the United States Medal of Freedom in 1946.

It was therefore with very much pleasure said the president, that he asked Mr Hartley to accept the Redwood Medal of this Institute.

After receiving the Medal, Mr Hartley said that the award was one of the most pleasant things which had happened to him. He had been privileged and happy to work in the oil industry and was certain that there were going to be tremendous opportunities in it.

A. C. Hartley showing his Redwood Medal to (left) *G. H. Coxon and J. A. Jameson and* (right) *Sir Stephen Gibson*

The Redwood Lecture

The title of Mr Hartley's lecture was "Pipelines". He said he had been extremely fortunate to have had the advantage of leadership and inspiration from some outstanding men. He wished to use the Redwood lecture, which commemorated a man of that type, to pass on some of the benefits he had himself received.

He had chosen the broad title of pipelines to describe some projects with which he had been associated in order to illustrate what could be done by enthusiastic teams in achieving a clearly defined, though almost impossible, objective.

His first introduction to pipelines was in 1910 in the Hull Docks Department of the North-Eastern Railway, in connexion with hydraulic gear for operating dock gates, etc. In 1916 he had the good fortune to be posted to the Air Ministry for service with the late Professor Bertram Hopkinson. Speaking of Professor Hopkinson, Sir Harry Ricardo, a previous Redwood Medallist had said: "He taught me never to accept anything second-hand unless it accorded with one's own common sense and experience; to be sceptical of one's own observations when they failed in this respect; and never to cling too long to a theory, however cherished".

Mr Hartley then discussed his work in connexion with the development of the Constantinescu gear, and made brief mention of some of his work with the then Anglo-Persian Oil Company.

As examples of team work, Mr Hartley then used several films and many lantern slides illustrating the development of PLUTO and FIDO. These were excellent examples of collaboration in which many members of the Institute and the oil companies had taken part. As the films and slides were shown, Mr Hartley described the progress of the development and recounted his own experiences.

THE HONORARY FELLOWSHIP

At the induction of John Oriel as an Honorary Fellow of the Institute, the president said the Institute honoured those who had served them well in various ways, and one of the ways in which it recognized good service was by the award of the Honorary Fellowship of the Institute. There could be no more worthy recipient of that award than John Oriel.

His first association with the petroleum industry was when he joined Shell Group in 1921 as a chemist in the Central Laboratories, then in Finsbury Circus. After occupying various technical posts, he became manager of the Suez refinery in 1934, and in 1938 became general manager of the newly-formed Shell Refining and Marketing Company. Among the major projects for which that company was responsible under his management were the Thornton Research Centre, refinery extensions at Stanlow and Shell Haven, the U.K. pipeline network, and Heysham refinery for the production of aviation gasoline. Even when he began to have difficulties with his eyesight, John Oriel carried on his duties with great determination, and as long as he could, with the efficiency which had always been one of his greatest characteristics, and even now he was an example to everybody, in the manner in which he continued to serve the industry in various ways. When he retired from the management of Shell, at the end of 1948, he retained his association with the Group, as an adviser on technical staff matters for the Shell Petroleum Company.

J. A. Oriel addressing the members after being awarded an Honorary Fellowship of the Institute

He had always taken a great interest in educational and scientific circles, and was associated with the establishment of, and took a great interest in, the Shell Chair of Chemical Engineering at Cambridge.

He still served on many committees and organizations, chemical and educational, and among these was another project which had been near to his heart, the committee connected with Churchill College. He had also been president of the Institution of Chemical Engineers, and had served our own Institute as a vice-president, as a member of its Council, and as a member of various committees. He had been a most active member of the Royal National Institute for the Blind, and does a great amount of work still in connexion with their Warwickshire association. He was awarded the Military Cross for gallantry in 1917, and the C.B.E. for his services to the war effort in the second war. It was fitting that the Institute should now add its own tribute to his efforts in the field of petroleum technology.

The president then asked Mr Oriel to accept the Honorary Fellowship of the Institute, with their very good wishes, and to sign the Book of Honour.

Those at the dinner to A. C. Hartley included Lt-Col S. J. M. Auld (past-president), G. H. Coxon (former hon. treasurer), A. J. Foster (member of Council), and E. LeQ. Herbert

The President speaking at the dinner to J. A. Oriel who is on the left. Lord Geddes, immediate past-president, is seated on the right

John Oriel, after signing the book, said it would be quite idle for him to pretend he could take that moment in his stride. After practically forty years in the industry, which was two-thirds of his lifetime and the whole of his working life, that moment could be nothing but one full of emotion. He was moved by a mixture of pride and humility. Pride in the thought that he had been thought worthy of the honour, and humility when he thought back on the names of those who had been so honoured in the past.

He was indeed an oil man, he said, and very proud of it. He had been fortunate to have been in that section of it, the refining section, which had gone through some of the most stirring times that any industry had ever gone through.

The oil industry had behind it a background of achievement which was the envy of any other industry. It was fashionable, in some quarters, to point out the ills that had befallen mankind due to the discovery of petroleum and to the invention of the internal combustion engine, its constant companion throughout the past half-century. They too sorrowed at the misuse to which their materials had been put by politicians the world over. But at the same time, he was sure that they were all proud of the fact that they had been concerned with an industry which had at the same time brought so many benefits to mankind. Those who had been in the oil industry had always felt their responsibilities quite keenly. Most, for reasons of the occurrence of crude oil, had spent a good deal of their time in countries other than their own. This had allowed them, in some small measure, to be ambassadors in those countries, not only for their own country but for their own faith. It had also fortunately been given to many to be in the position to bring improvements to the people of those countries, not only in their material lot, but also in bringing to them the scientific and moral values of Western civilization. He also firmly believed that they had all done this without any hope, or thought, or wish for recognition in any form.

He was therefore deeply sensible that night for the thought, and yes, the kindness, of the Awards Committee, concluded Mr Oriel.

It is announced with deep regret that A. C. Hartley died on 28 January in a London hospital, after a short illness.

J. A. Oriel speaking at the Council dinner in his honour. Others seen in this picture are: Dr C. M. Cawley, Dr E. B. Evans, and Sir Philip Southwell

* * *

INTERNATIONAL SYMPOSIUM ON DISTILLATION

Experts from all over Europe are expected to gather at Brighton for the International Symposium on Distillation, to be held there on 4-6 May 1960 as a meeting of the European Federation of Chemical Engineering.

Organized by the Institution of Chemical Engineers, in co-operation with the Chemical Engineering Group of the Society of Chemical Industry, the preliminary programme of the Symposium contains 29 papers from experts in nine countries. These are under the main subject-headings of: Heat and Mass Transfer, Vapour-Liquid Equilibria, Performance of Packed Columns, Performance of Tray and Other Columns.

Attendance at the Symposium is open to all. Registration fees are £4 for members of the Institution of Chemical Engineers, the Chemical Engineering Group (Society of Chemical Industry), and of the constituent bodies of the European Federation. For non-members of these organizations the fee is £5.

Enquiries should be addressed to The General Secretary, The Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1.

Around the Branches

ABADAN, BAHRAIN, ESSEX, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN, SOUTH WALES, STANLOW, TRINIDAD, YORKSHIRE

Yorkshire Branch Dinner

The first Annual Dinner of the Yorkshire Branch of the Institute took place at the Prospect Hall, Cleckheaton, on 18 November 1959. This little-known place, snugly hidden in the midst of its West Riding neighbours, must have caused some concern to the organizers, anxiously wondering whether members and their friends would ever find the spot! A detailed map was sent to each applicant for tickets, and this enabled those drivers with efficient navigators to arrive on time. The story was heard of one member, who must remain nameless, doing a "recce" on the same afternoon and boastfully stating to his compatriot over the telephone at 5 p.m. that there was positively no trouble and that the way was simple. Total darkness can be so confusing! ! His particular party arrived just as the prawns in their cocktails were wondering when, and why!

It was now transparently obvious that the Motor Car Rally held in June had been organized merely to prepare members for the first part of the evening.

A total of eighty members and guests sat down to a very excellent meal, which was considered by all present to be well worth all the trouble everyone had undergone to be there to enjoy it.

The Branch chairman, G. J. C. Vineall, was pleased to have the following guests at his table: D. A. Hough (general secretary) and Mrs Hough, T. G. Provest (Northern Branch chairman) and Mrs Provest, and G. R. Hey (president of the Yorkshire Lubricating Oil & Grease Traders Association) and Mrs Hey. Unfortunately the president of the Institute, C. M. Vignoles, and his wife, were unable to make the trip, and apologies were received from George Sell, who was indisposed, and his wife.

After initial drinks at the bar and the usual pre-meal banter, all were seated. A touch of colour was added by the delightful spray of flowers so thoughtfully provided for each lady.

After the meal entertainment was given by excellent local talent, and thoroughly appreciated by all. Mr Hawbridge, a comedian, started the ball rolling, dressed as a dales farmer. His dialect was so pronounced that even the most "Ilkley Moorish" of members had difficulty at first in following him.

The most charming part of the cabaret—at least as far as the male guests were concerned—was the delightful singing of Ann Wood, who enchanted everyone with her style and presentation of several popular songs. Illusionist George Blake proved the old axiom that the quickness of the hand deceives the eye, with an extremely clever and perplexing performance. At very short notice, in fact less than an hour, the difficult job of accompanying the artists was taken over by Stan Hardman. He replaced the advertised pianist, who fell sick at the last moment, and proved himself an exceptionally clever performer. Which just goes to prove how versatile the committee members of the Yorkshire Branch really are!

Mr Vineall thanked the artists for their much appreciated efforts, and the evening drew to a finish with friendly chatter. Finally, when no more drinks were available, it was time to depart and try to re-discover the way home. The First Annual Dinner has been a great success.

South Wales Branch

On 10 December 1959, the South Wales Branch was addressed by R. B. Southall, C.B.E., F.Inst.Pet., on "A History of Llandarcy".

Mr Southall commenced his talk by stating that Llandarcy was the first major oil refinery to be built in the U.K., and he detailed some of the economic and geographical factors that probably led to its choice as a site for an oil refinery. Llandarcy suited the strategical requirements of the 1914–18 war outlook which demanded a sheltered position on the west coast, with easy port access.

Mr Southall described the type of plant in operation during the early years. The main distillation plants consisted of shell stills processing Persian crude oil and once-run distillate. This equipment was later modified by the inclusion of fractionators so that, by the early thirties, the need for redistillation was eliminated.

Together with the conventional processes, development was going on in the field of cracking operations. The Dubbs and Cross processes were installed, and later a continuous process which involved cracking in the vapour phase. During 1938 the former Cross Cracking plant was re-vamped in co-operation with the Kellogg Corporation for experimental work on what was later to become the catalytic cracking process.

During the 1939–45 war, production was reduced to a minimum by the stoppage of deliveries of crude oil from the Middle East. Operations were supplemented however by processing crude oils and residues received from U.S.A. and South America. In addition the docks and tank farm installations were in full use handling imported finished products.

Describing the part played by Llandarcy in the manufacture of lubricating oils, Mr Southall recalled how, despite early discouraging results, Llandarcy became an important producer of a full range of lubricants and waxes from Middle East crude oils.

From 1946 onwards refinery production had increased, reaching a maximum of nearly five million tons a year following the temporary shut-down of Abadan refinery. The throughput has since been maintained at a steady three million tons a year, plus the redistribution of half a million tons of imported products.

During the talk a number of interesting slides were shown which illustrated the early plants and processes of Llandarcy. The chairman, A. Patrickson, passed a vote of thanks which was warmly acclaimed by those present.

Fawley Branch

A meeting on the subject of "Chemical Fertilizers in Agriculture" was held at the Fawley Branch of the Institute on 9 December last, W. D. Carson of Fisons Ltd being the speaker. Mr Carson emphasized at the beginning of the talk that he was not a chemist, and would be speaking from the farmer's point of view. He particularly wanted to emphasize this point, since besides questions which could come from petroleum technologists, this was a joint meeting with the Southern Branch of the Royal Institute of Chemistry.

After this introduction Mr Carson proceeded to include in his description of agricultural practices a number of points on the chemistry of the fertilizers used. His assumption that the audience knew very little about the history of the fertilizer industry was, for the most part, correct, and therefore his graphic explanation of the growth and changes of the industry was followed with much interest.

After this historical survey, Mr Carson talked about the results obtained by the use of modern fertilizers, and while showing some very excellent slides, suggested that visual observation of plant progress made a larger contribution to effective soil treatment than was usually obtained from soil analysis. This point was made shortly before he completed the talk, and was very quickly taken up in the discussion.

The relative merits of field observation and laboratory work were very well aired, to the great interest of those in the audience who could feel that in this discussion they were sitting on the sidelines. Appropriately enough, the discussion had been opened by Dr Parker, who is a Council Member of the Royal Institute of Chemistry, and the hearty vote of thanks given to Mr Carson at the close of the meeting was proposed by Dr D. F. Jacques of the Fawley Branch.

Scottish Branch

The Annual General Meeting of the Scottish Branch was held in the Recreation Hall of BP Refinery (Grangemouth) Ltd on 21 January.

Dr G. H. Smith, M.C., chairman of the Branch, presided and, after giving his Annual Report of the Branch activities for the previous year, thanked the honorary secretary (W. Stirling) and the honorary treasurer (F. M. Cook) for their services.

Dr G. H. Smith and Dr W. B. Peutherer were re-elected to the committee, and N. W. Huskisson was elected to fill the vacancy created by the resignation of J. A. Brown.

Dr Smith introduced the speaker, R. Hayes, of the Distillers Plastic Group, whose subject was "Plastics from Petroleum".

The speaker said that plastics were high molecular weight organic materials. They had a number of basic advantages and limitations compared with traditional materials such as metals, wood, and glass. Their main advantages were as follows.

(1) Since they were plastic at some stage in their life, they were particularly suited for mass production techniques.
(2) The corrosion and chemical resistance of most plastics was good.
(3) All plastics materials had good electrical properties.
(4) All plastics materials were light in weight and many of them could be manufactured in a wide range of colours.

The basic limitations of plastics materials were as follows.

(1) They had limited strength, particularly tensile strength, and were not usually used on their own in structural applications.
(2) Even the rigid plastics were considerably less stiff than metals.
(3) All plastics materials had a limit in the temperature at which they could be used successfully.

It was said that ethylene was an important raw material of the plastics industry. Styrene and vinyl chloride could be produced from ethylene. Polyethylene, polystyrene, and polyvinal chloride were the three most important thermoplastic materials produced in the world to-day. Although they were all derived from ethylene, there were considerable differences in their properties. These differences derived from variations in chemical constitution and also variations in the structure of the molecular chains.

Plastics materials were said to be particularly suited for mass production techniques. The processes which could be used with thermoplastic materials, namely, injection moulding, extrusion, vacuum forming, and calendering were described.

The fields of application of polyethylene, polystyrene, and polyvinal chloride were outlined. These ranged from industrial uses, such as coal mine conveyor belting, deep sea fishing nets, low-temperature insulation, and chemical pipe, to more domestic applications such as long-playing gramophone records, leathercloth upholstery, refrigerator liners, and washing-up bowls.

The talk was well illustrated with lantern slides, and a range of articles produced from the three mian types of plastic materials, for domestic and industrial use, were on view.

After a lively discussion, the meeting closed with a cordial vote of thanks to the speaker.

Northern Branch

The Annual Film Show and Hot Pot Supper of the Northern Branch was held on 8 December, and, as is usual on these occasions, it was attended by a capacity gathering of some 80 members of the Branch. The chair for the evening was taken by the hon. treasurer, E. R. Wilson.

The Film Show was held in the ABC Television Theatre, Mount Street, Manchester, and the following films were shown:—*Fire Under Control* (Mobil Oil Co.): *Introduction to Modern Gears* (Shell-Mex and B.P.): and *Song of the Clouds* (Shell International Petroleum Co.).

The Hot Pot Supper followed in the "Old Nag's Head", Jackson's Row, and a very pleasant evening was completed by after-supper entertainment provided by the Cheetham Brothers with Shirley Davies.

AT THE LONDON BRANCH DINNER PARTY

In spite of a defective flash-gun, the editor managed to get a few pictures. Most were taken during the pre-dinner cocktail period and show but a few of those present. The others show (top left) *a study in concentration during the "Peanuts and Mathematics" event and* (centre left) *Ron doing his stuff*

"Variety is the spice of life" must surely be the motto of the London Branch when organizing its annual social event, for each year brings something different from previous occasions. This year, on 21 January at the Chatham Rooms, and under the chairmanship of J. C. Jewell, the Branch Chairman, the official title was "Dinner Party" and it was just that—and very enjoyable.

The preliminary cocktail period provided an opportunity for the revellers, who numbered over seventy, to get acquainted. Dinner had barely started when the chairman was called upon to draw the number of the "Lucky Table"—and the prize was roses for the ladies and large chrysanthemums for the males. Presumably the size of the gifts were in inverse ratio to the natural beauty of the recipients.

Dinner over, the real business of the evening commenced. Listed on the programme as "Peanuts and Arithmetic" it turned out to be "Housey-Housey" the peanuts being used to cover the numbers (and incidentally as ammunition to distract attention). This mental exercise completed and the prizes distributed, the stage was then taken by Paula Baird. This charming young lady proceeded to entertain with a remarkable display of card manipulation, having the rather doubtful "assistance" of Don Watson and Roy Rudd.

Last item of entertainment on the programme was given as "Short Film". It was in fact three short films—"Go Slow on the Brighton Line", "The Battle of New Orleans", and Goofy in "Motor Mania". These were projected by that well-known film expert, Ron Leach, and were much enjoyed.

In order to avoid any disappointment, everyone present was allowed to draw a prize during the evening, the gifts having been donated by various oil companies. A welcome feature was the limiting of speeches to two—the first to announce that there would be no speeches, and the second to ask the members to "take wine with Stan Price" as a token of their appreciation of his efforts in organizing the function.

Final entry on the agenda read: "11.00 p.m. Call me a cab!" At that stage nobody would have really minded what they were called. All agreed that it had been a jolly evening.

Stanlow Branch

The 143rd meeting of the Stanlow Branch was held on 17 November 1959 at Blossoms Hotel, Chester. In the absence of the chairman, C. N. Thompson, the honorary treasurer, F. P. Taylor, deputized.

Mr Taylor notified the meeting that there would be four vacancies on the committee for 1960–61. These were caused by the retirement of Messrs Brooman, Taylor, and Swain, and one resignation. The first three members were eligible for re-election.

The chairman then introduced the lecturers, R. M. Hosie and K. A. Troth, and the former delivered the lecture on "An Introduction to the Free-Piston Engine".

The lecturer began by explaining the general principles of the free-piston engine, which had in fact been originally developed as far back as 1925. Certain advantages compared with other types of engine, such as freedom from crankshafts, vibrations, and the possibility of using high-compression ratios up to 60 : 1 were also discussed.

The advantages to be gained from the flexibility of layout of a multi-gasifier installation, especially in marine propulsion, were pointed out, and the simplicity of mechanical design was also stressed.

The lecturer then went on to enumerate the possible uses for the free-piston engine, these being mobile and self-contained power plants where a number of units could be connected together, marine propulsion, and also as a practical alternative to other types of prime mover (*i.e.* compression or spark ignition engines).

The discussion was opened by C. Goodacre of Associated Ethyl Co. Ltd and continued in a lively fashion until 9.05 p.m, when a vote of thanks was given from the Chair.

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Personal Notes

Sir Stephen Gibson, C.B.E., M.A., M.I.Mech.E., F.Inst.Pet., has joined the board of directors of Woodfield Pickering Ltd as chairman.

B. R. Fraser, B.Sc., F.Inst.Pet., at present manager of Coryton refinery, has been appointed manager of a new manufacturing department to be located in the Company's head office. He will be responsible for co-ordinating the work of the refinery, the blending works at Wandsworth, and the blending works and grease plant at Birkenhead.

B. R. Fraser

Mr Fraser, who gained a B.Sc. (Hons.) in chemistry at St. Andrews University, joined Mobil in 1952 from the Burmah Oil Company, where he had been manager of the Digboi refinery. In March 1954 he was appointed manager of the then newly-constructed refinery at Coryton.

J. W. Bartholomew, F.Inst.Pet., at present assistant refinery manager at Coryton, succeeds Mr Fraser, and **C. E. Bean**, A.F.Inst. Pet. operating superintendent, is appointed assistant refinery manager.

Bagher Mostofi and **Manouchehr Farmanfarmaian** have been appointed to the board of directors of the National Iranian Oil Company.

Mr Mostofi has been managing director of the Iran Oil Co., an exploration subsidiary of NIOC, since 1954. He obtained B.Sc. and Honours degrees from the University of Birmingham.

After working for some time at the BP Research Centre at Sunbury, he returned to Iran and was employed in the southern oilfields. From 1941–44 he worked for the Ministry of Agriculture, and afterwards came to London and obtained a D.I.C. degree at Imperial College of Science and Technology.

In 1947 he returned to Iran to become manager of the Oil Exploration Department of the Ministry of Finance, and in 1949 was appointed to the board of directors of the Iran Oil Co.

Mr Mostofi holds the Cadman Award for Science from the University of Birmingham.

Mr Farmanfarmaian was, for several years prior to the Iranian oil nationalization, director of the Division of Petroleum Concessions in the Ministry of Finance. In 1954 he was appointed to the board of auditors of NIOC, and a director of the Iran Oil Refinery Co.—one of the Iranian oil operating companies. He became chairman of the Iran-Canadian Oil Co. (IRCAN) in 1959.

Mr Farmanfarmaian obtained his baccalaureate in France and continued his studies at the University of Birmingham, where he received his B.Sc.

S. Tindale

Sydney Tindale, M.Inst.Pet. has been appointed general manager—marketing of the National Benzole Company with responsibility for the Company's sales and physical operations.

A Newcastle-on-Tyne man, he started his career after the first world war with Priestman Collieries Ltd, and was later appointed assistant to the general manager of their associated company, The Newcastle Benzol Company Ltd. In 1928 Mr Tindale joined the National Benzole Company after they had acquired the assets of the Newcastle Benzol Company.

In 1948, after serving with the Petroleum Board, he was appointed manager of Northern Division, and in 1953 was transferred to the Company's London headquarters as assistant sales manager, since when he has held a number of senior head office appointments.

R. Hussey, sales director of James Gordon & Co. Ltd, has transferred from the class of Associate to Corporate Class of Member in the Institute of Heating and Ventilating Engineers.

K. W. Sims

K. W. Sims, A.F.Inst.Pet., has been appointed export promotion manager of C. C. Wakefield & Co. Ltd.

Kenneth Sims joined the Company in 1951 as an industrial oils sales representative. In 1954 he was transferred to the Overseas Division and posted to Cyprus as resident manager, Middle East. Three years later he returned to headquarters and was then attached to the Group's American subsidiary, Castrol Oils Inc, as sales manager. His latest promotion follows the conclusion of this appointment.

Foster Wheeler Ltd has announced the following changes to the board of directors.

Consequent upon the resignation of G. H. Hopewell from managing directorship of the Company, **C. E. H. Verity,** O.B.E., M.I.C.E., M.I.Mech.E., M.I.E.E., M.I.Mar.E., M.Inst.F., A.S.M.E., will become managing director, and will continue as manager, Steam Division.

R. B. Kerr, M.B.E., Grad.I.Chem.E., A.M.Inst.Pet., will become deputy managing director, and manager, Process Plants Division.

Mr Hopewell will remain a director of the Company, and will take the position of deputy chairman.

H. T. Collinswood is retiring from the post of manager, Process Plants Division, but will remain a director of the Company.

J. J. Scholes

J. J. Scholes, the manager of National Benzole Co's Lancashire Division since 1948, retired at the end of 1959, and was succeeded by **T. F. Macfarlane,** the Company's retail marketing manager.

Mr Scholes joined the Company in 1927 and was its aviation manager in 1930-39, becoming one of the first flying salesmen in Britain. During the second world war he was seconded to the Aviation Department of the Petroleum Board, and was responsible for liaison between the Board, the aircraft and aero-engine manufacturers, and the civil air operators.

T. F. Macfarlane joined National Benzole in 1949 as a sales representative at Hexham. In 1955 he was appointed assistant divisional manager of Lancashire Division, becoming manager of the Company's Consumer Trade Department in 1957, and manager of the Retail Marketing Department in 1958.

Bryan Turle, head of the Racing Section of Shell-Mex and B.P. Ltd, has been appointed manager of the Worcester Branch of the Company.

Mr Turle will be succeeded by **K. N. R. Ballisat** and **J. R. H. Gooding,** who will be responsible for Shell and BP interests respectively in the racing field. Mr Ballisat has been with the Shell International Petroleum Company, and Mr Gooding with the Chester Branch of Shell-Mex and B.P.

C. R. Woodfield, M.Inst.Pet., has been appointed general manager, and **H. G. Priest** manager of the Production Department, Group Works Division of the Wakefield Castrol Group, based at Castrol House, London. This newly-formed group will be responsible for the overall administration of the Company's twelve production centres in the United Kingdom.

C. R. Woodfield

G. W. M. Wiggins has been appointed manager of Consumer Trade Department, Petrofina (Gt Britain) Ltd. **N. C. Gardener** joins the department with the appointment of national accounts representative.

N. Firmston-Williams, previously assistant manager, National Accounts, has been appointed assistant manager, Industrial Fuel Department.

J. W. Davies

Wakefield-Dick Industrial Oils Ltd has appointed **J. W. Davies** as its representative for the Sheffield area, in succession to **A. S. Watson** who retires after 35 years in a similar capacity.

Mr Davies joined Davy & United Engineering Company Ltd in 1947 as a draughtsman specializing in lubrication. He became, successively, section leader, assistant lubrication engineer and, finally, two years ago, engineer in charge of the Lubrication Department.

J. B. Blakeborough, M.Inst. Pet., becomes joint managing director of Acme Conveyors Ltd, of Glasgow, Hillington, and Walsall.

FUEL OIL SYMPOSIUM

The Yorkshire Branch of the Institute are holding a fuel oil symposium in conjunction with the University of Leeds, at the Houldsworth School of Applied Science, Reservoir Street, Leeds, on 30 March, commencing at 2.30 p.m.

The chairman will be Prof. A. L. Roberts, B.Sc., Ph.D., F.Inst.F., F.R.I.C., F.I. Ceram., Hon.M.Inst.Gas.E., and the papers will be as follows.

(1) "The Scientific Principles of Combustion of Fuel Oil" by Dr J. E. Garside, B.Sc., M.Inst.F. (senior lecturer in Fuel Technology, The University of Leeds).

(2) "Combustion in Practice" by C. A. Roast, A.M.I.Mech.E., A.M.I.Elec.E., M.Inst.Pet. (Esso Petroleum Co. Ltd).

(3) "Recent Applications of Fuel Oil" by T. Chippindale, A.M.I.Mech.E., M.Inst.F. (fuel oil manager, North Eastern Region, Shell-Mex & B.P. Ltd).

From 5.15 p.m. to 6.30 p.m. approximately, discussion on the three papers will take place. Members or visitors wishing to attend should apply to the hon. secretary of the Yorkshire Branch before 23 March, with full remittance. The cost is 2*s* 6*d* per person, including tea.

Notes of the Month

Jersey Standard in 1960

Prospects appear favourable for continued improvement during 1960 of sales and earnings of Standard Oil Company (New Jersey), Eugene Holman, chairman of the board, said recently in a year-end review and outlook.

"In 1960, the increase in free world petroleum demand is expected to be somewhat better than five per cent or nearly 1 million barrels per day. This prospect reflects an estimated gain in the United States of about four per cent and nearly seven per cent abroad."

Looking further ahead than 1960, Mr Holman said that it was thought that by 1975 the free world's consumption of oil would be around 14 million barrels a day higher than in 1958.

Mr Holman said that in 1960 Jersey was, as in 1959 and 1958, programming something just under $1000 million for capital expenditures for producing, refining, marketing, and transportation facilities, and for other expenditures in the search for oil and gas.

About 45 per cent of the consolidated companies' 1960 expenditures would be made in the United States; 29 per cent in Canada and Latin America; and 26 per cent in free areas of Europe and the Eastern Hemisphere. Functionally, Jersey's capital expenditure for 1960 would be divided into about 17 per cent for marketing, 21 per cent for refining, 14 per cent for transportation, and 48 per cent for producing.

It was also said that Jersey Standard research expenditures in 1958 had totalled $62 million, would certainly have exceeded that in 1959, and would probably do so in 1960.

Shell Joins Liquid Methane Interests

It was announced on 13 January that the interests of the Royal Dutch Shell Group of companies, Continental Oil Company, and the Union Stockyards and Transit Company of Chicago in the liquefied natural gas field are to be developed through the medium of a jointly-owned company to be known as Conch International Methane Ltd.

Continental Oil and Union Stockyards, both American companies with head offices in Houston and Chicago respectively, have pioneered research in the liquefied natural gas field through their joint subsidiary, Constock International Methane Company Ltd. Constock, after much costly research in transporting natural gas in liquefied form at a temperature of minus 258 F, has acquired valuable experience and patents in this entirely new field.

As a result of this work Constock and the Gas Council in the U.K. participated through a joint company, British Methane Ltd, in the recent project to ship liquid methane on the *Methane Pioneer* from Lake Charles, Louisiana, to the United Kingdom.

Shareholders in Conch International Methane Ltd will be Canadian Shell Ltd, Continental Oil, and Union Stockyards.

Exploratory Drilling in N.W. Canada

In a progress report on their 1959 operations Canada Southern Petroleum Ltd reported a prospective increase this winter in the tempo of exploratory drilling operations in the North-West Territories and north-east British Columbia, which would be probably 50 per cent higher than for any previous season. It was stated as a "strong probability" that a minimum of 12 of these exploratory tests would be drilled on Canada Southern properties. They represented the first tests of the largest structure known to have been mapped by seismic methods in the sedimentary basin of Western Canada, east of the Rockies.

These tests were begun at the end of 1959 on the 1,200,000 acres farmed out by Canada Southern last June, and reported in the September issue of the *IP Review*, to a group comprising of Home Oil Co., Signal Oil & Gas Co., Kern County Land Co., Alminex Ltd, and United Oils Ltd.

Exploratory drilling planned for northeast British Columbia included tests by Phillips Petroleum at its Kledo Creek No. 1 location, approximately 35 miles west of Fort Nelson, in which Canada Southern holds a 27½ per cent interest, and a second test at a site in which the Company has an identical percentage interest, located about three miles north-west of Sinclair's important Doig River oil discovery. The Canada Southern statement also reported the resumption by Sinclair Canada Oil Company and Pacific Petroleums of operations at their XB-20-1 wildcat location, in which Canada Southern owns a 13¾ per cent interest.

Discussing the Company's interests in the Fort St John—Boundary Lake area, it was said that the prospects of early construction of the recently-announced oil pipeline into this area by Peace River Oil Pipeline Ltd might be expected to result in a record development drilling programme at the Boundary Lake field this winter. The 15 oilwells completed in the field to date were estimated to have put an additional 60 locations in a proven and semi-proven category.

West German Oil in 1959

Erdöl-Informationsdienst, of Hamburg, gives details of West Germany's crude oil production in 1959. The estimated total of 5,102,991 metric tons was an increase of 15·2 per cent over the figure for 1958. The regional share of production was as follows:—

Region	1959	1958
	Metric tons	
Holstein-Hamburg	449,781	447,317
Emsland	1,352,696	1,283,469
Weser-Ems	1,142,960	951,526
Hannover	1,865,432	1,538,713
Oberrheintal	178,381	149,242
Alpenvorland	113,741	61,329
	5,102,991	4,431,596

Esso Acquires Libyan Oil Concessions

Following approval by the Libyan government, Esso Sirte Inc has acquired from Libyan American Oil Company and W. R. Grace and Company an undivided half interest in concessions 16, 17, and 20 in the Cyrenaica and Tripolitania provinces of Libya. Libyan American Oil Company is a wholly-owned subsidiary of Texas Gulf Producing Company. Esso Sirte is a wholly-owned affiliate of Standard Oil Company (New Jersey) which also owns Esso Standard (Libya) Inc.

Esso Sirte will be the operator of the concessions which include two completed wells capable of producing about 2000 barrels daily in concession 17 in Tripolitania province. Oil has been found in a third well in the same concession which is now being completed.

The Search for Oil in Nigeria

During 1959 The Shell-BP Petroleum Development Company of Nigeria Ltd has drilled 34 exploration wells, of which seven have produced oil on short tests and 27 have been dry holes. In addition, 16 successful appraisal oil wells have been drilled.

Four exploration wells were drilled during November, one 15 miles north of Port Harcourt, at Igrita, drilled to a depth of 10,700 ft, being successful.

It has been announced in Lagos that oil has been found in economic quantities in Nigeria after 22 years' search that has so far cost £60 million. It was also stated that, provided development work went on according to schedule, it was estimated that Shell-BP should be producing an average of at least 30,000 barrels of oil a day (about 1,500,000 tons a year) by the end of this year, compared with an average of 15,000 barrels a day in 1959.

The Company has also commissioned another seismic exploration party in the oil search in the Western Region, where it is at work near the Ramos River, some 30 miles south-west of Warri.

This brings the number of seismic parties working for Shell-BP in Nigeria to eight—a total of over 2000 men on exploration work alone. This is quite apart from the drilling effort and its engineering and other services which together employ about another 3000.

The number of seismic parties working for the company has doubled since oil was found at Oloibiri in 1956.

Netherlands Crude Oil Production

NV Nederlandse Aardolie Maatschappij announce that in 1959 they produced 1,775,000 metric tons of crude oil, compared with the 1958 production of 1,620,000 metric tons.

NAM also supplied about 188 million cu m of natural gas to the Netherlands State gas undertaking, an increase of more than 35 per cent over 1958.

The Royal Dutch/Shell Group and Standard Oil Company (New Jersey) have an equal interest in this company.

Assam Drilling Records

The Assam Oil Company achieved a new drilling record just before the end of 1959, when a well at Nahorkatiya was drilled to a depth of 9050 ft in 8 days 18½ hours, at an average speed of nearly 1032 ft per day.

Other achievements by the Company during 1959 was the drilling of 14 wells at the same place and Moran to a total depth of 139,985 ft, an average of more than one well a month.

At Nahorkatiya, well No. 47 drilled 2559 ft in 8 hours, an average of nearly 320 ft per hour. The time taken from the spud-in of one well to the spud-in of the next well using the same rig also showed an improvement of nearly 50 per cent over the 1958 figure of 50 days. In 1959 it was 26 days and the record for that year was 21 days 4 hours between Nahorkatiya Nos. 50 and 51.

Shell Oil Company—1959 Income

Net income of Shell Oil Company and all wholly-owned subsidiary companies for the year 1959 is estimated at $147,400,000. This compares with $128,583,000 for the year 1958 restated to reflect the adoption at 31 December 1958 of revised policies for the amortization and depreciation of production properties. Earnings per share amounted to $2·43 and $2·12 respectively, based on 60,573,368 shares outstanding at 31 December 1959.

Australian Petrochemical and Refining Developments

An agreement involving the construction of new and expanded plant for the manufacture of petroleum chemicals in New South Wales has been reached between Shell Chemical (Australia) Pty Ltd, and Imperial Chemical Industries of Australia and New Zealand Ltd.

Shell Chemical will erect an ethylene manufacturing and purification unit at Clyde, NSW, in association with Shell's refinery there. The ethylene so produced will be piped to ICIANZ at Botany, NSW, where its immediate use will be in the manufacture of polythene.

ICIANZ's plant at Botany, already extended several times, is currently being further increased, and the total investment represented by ICIANZ's extended facilities at Botany, and Shell's new ethylene plant at Clyde, will be over £A10 million. Construction of the new plant at Clyde is expected to start in 1960, and to come on stream within two years.

A feature of the agreement reached by the two companies is that a portion of the polythene manufactured by ICIANZ will be marketed by Shell Chemical (Australia) Pty Ltd. This marketing development, although new to Shell in Australia, is in line with current marketing activities of Shell Chemical's overseas associates.

The new ethylene plant at Clyde will be a further stage in the refinery expansion programme, the first part of which was a £A9 million rebuilding scheme completed earlier last year.

In addition, a new £A17 million catalytic cracking plant, primarily for the production of motor spirit, is to be erected at the Clyde refinery. Work on the plant is expected to begin early this year, and it will take three years to complete. On completion, this new unit will be the biggest of its kind in Australia and one of the biggest in the world.

It will have a capacity of 150 million gallons of motor spirit yearly, and when it comes on stream will increase total motor spirit output at the refinery to more than 250 million gallons yearly—equivalent to a quarter of the total Australian motor spirit consumption.

The new unit will also provide a supplementary feedstock for the new ethylene unit.

Associated with the project will be the construction of new port facilities at Gore Bay costing approximately £A1 million, as well as an oil pipeline from Gore Bay to Clyde, a distance of about 12 miles, which is alone estimated to cost £A800,000.

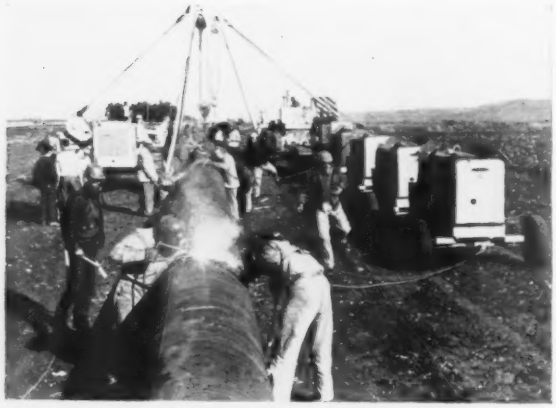
The total investment at Clyde when these projects are completed will be over £A40 million, bringing Shell's total investment in Australia to over £A120 million.

Earlier in 1959 it was decided to build a £23 million petrochemical complex of four plants at Altona (Victoria) to produce ethylene, butadiene, polyethylene, and styrene. Construction work on the key plant is scheduled to start in 1960.

A fifth petrochemical plant at Altona to produce carbon black from feed stocks provided by the adjacent refinery, was brought into production in 1959. This is the first plant to produce carbon black in Australia. It can cater for all the carbon black used in the rubber tyre industry and is effecting a great saving in imports. Previously all Australia's supplies of carbon black were imported.

Other developments in petrochemicals in Australia during the year were the beginning of construction of an epikote resin plant at Clyde refinery, a detergent alkylate plant at Geelong (Victoria), and a decision to go ahead with the production of styrene monomer and the building of a Udex plant near Sydney.

IPC Pipeline in Lebanon



The above photograph shows welders at work on the 30-in diameter pipeline being constructed by Motherwell Bridge Contracting and Trading Co. for the Iraq Petroleum Co., in North Lebanon. The line, which is well ahead of schedule, runs for a distance of 20 miles from the Company's Tripoli terminal to the Syrian frontier

Esso Pipeline for West London and London Airport

Esso Petroleum Company are seeking planning permission from the appropriate authorities to lay a 75-mile oil products pipeline from Fawley refinery to a new distribution depot, having a storage capacity of 20 million gallons, near London Airport. The total project will cost £2½ million.

This will be the first large-scale commercial pipeline for refined products to be laid in Britain. All grades of light oils will be pumped direct from the Esso refinery to the new distribution depot, from which deliveries will be made by road into a wide area including the whole of west London, and in the case of aviation fuels, by separate pipelines to London Airport.

The proposed route of the pipeline, which will be buried to a depth of at least 3 feet over the whole distance, will carry it under Southampton Water and under the Thames. It will also pass under several railways, major highways, paved roads, rivers, and canals.

The pipeline will be all-welded and specially protected against corrosion, and will have an initial capacity of 1½ million gallons a day. It is hoped to commence work this year and completion is planned by the early part of 1963.

Special Solvents Plant for Kent Refinery

Equipment for the production of special solvents used in the manufacture of paint and lacquers, and also in the essential oils, fatty oils, and rubber industries, is being constructed at BP's Kent refinery on the Isle of Grain.

This will be the first installation constructed by BP in the U.K. for manufacturing these special boiling point solvents. The project consists of an acid washery and a redistillation unit, as well as associated tankage, lines, pumps, and loading facilities for road and rail transport.

The plant, which will have a capacity of 30,000 tons/year, has been designed by BP, and the project is scheduled for completion in 1960.

Petroleum Refinery for Durban

The BP Group is to participate, as partners with Shell, in the new £25 million refinery project at Reunion Rocks near Durban, for which, as recently announced, a site is being acquired adjoining the national airport. Parliamentary approval for the scheme is being obtained.

The refinery will be owned by South African Petroleum Refineries (Pty) Ltd, a newly-registered private company incorporated in South Africa, in which the Royal Dutch/Shell and BP Groups have joined forces as equal partners in order to benefit from the economies of large-scale refining operations. The new refinery will supply the needs of the "Shell" and "BP" marketing companies in South Africa, whose operations will continue unchanged.

The chairman of the new company is P. M. Dowson, managing director of the local board of The Shell Company of South Africa Ltd, and C. T. Williams, general manager of BP Southern Africa (Pty) Ltd, is also a director.

It is hoped that the refinery, which will have a capacity of some three million tons per annum, will be in operation by 1963.

Foundation Stone Laid at Mersin

The Prime Minister of Turkey, Adnan Menderes, on 6 January laid the foundation stone of an £18 million refinery at Mersin, in south-east Turkey. The project is being financed by three refining companies associated with Mobil International, Royal Dutch/Shell, and British Petroleum, whose shares in it will be 56 per cent, 27 per cent, and 17 per cent respectively.

The Mersin refinery, which will have a capacity of 65,000 barrels a day, will be built by the United Kingdom firm of Foster Wheeler Ltd, an affiliate of the Foster Wheeler Corporation of the United States, and is expected to go on stream towards the end of 1961.

The refinery will make a substantial contribution to the Turkish economy in the form of considerable foreign exchange savings, additional employment, and the purchase of local materials and services.

Natural Gas Plant at Whitby

P.G. Engineering Ltd (member of the Power-Gas Group), Stockton-on-Tees, has received instructions from the North Eastern Gas Board to build a plant at the Whitby gasworks to reform natural gas. The installation will be the first of its kind for this application in Britain, and is due for completion by July 1960.

The plant will comprise three two-tube P.G. Hercules furnaces (two working and one standby) and will be designed to produce a total of 1,250,000 cu ft of town gas/day.

The natural gas will be obtained from wells on the nearby North Yorkshire Moors, and in the event of failure of this supply the plant will also be capable of producing town gas by the reforming of commercial butane.

Record Australian Motor Spirit Consumption

Consumption of motor spirit in Australia in 1959 was breaking records for the country towards the end of the year, according to the Petroleum Information Bureau (Australia).

For the first ten months of the year sales of motor spirit exceeded those in the corresponding period of 1958 by 7 per cent. Consumption in December was expected to be more than 110 million gallons. This would be 9 per cent higher than in the previous December, when sales surpassed 100 million gallons a month for the first time.

The sharp increase in sales of motor spirit in recent months was due to the strongly-rising trend in new car registrations and to an improvement in general prosperity and spending power. A record number of over 250,000 new cars were registered in 1959.

The Australian public has shown an increasing preference for premium over standard grade of motor spirit during the year. Over the country as a whole sales of premium motor spirit rose by 22·2 per cent in the first ten months of the year. Sales of standard grade dropped by 4·28 per cent. New South Wales was the only State where sales of premium exceeded sales of standard grade. There was also a high proportion of premium to standard grade sold in Victoria, but in the less-developed States where metropolitan populations are small, the proportion of premium remained relatively low.

Esso Marine Research Programme

A full-scale technical attack on the costs of marine transport has been undertaken by Esso Research and Engineering Company and nineteen other affiliates of the Standard Oil Company (New Jersey). The project—the Marine Testing and Improvement Programme—is aimed at making substantial economies in the $400-million bill paid annually by Esso companies for transporting crude oil and products by water. The marine research projects will be carried out individually by the participating companies, with technical and administrative co-ordination by Esso Research and Engineering.

In one series of tests already completed, small models of oil tankers helped to throw new light on the effects of wind and waves on vessels of ocean-going size. Tests in a wind tunnel showed that the forces created by wind blowing against the side of a tanker have usually been over-calculated in the past. These forces determine the strength and therefore the cost of a pier; and a 10 per cent reduction in a large pier could result in a saving of more than £17,000. The wind tunnel tests were made on a 39-inch version of a tanker capable of carrying 38,800 tons. In a score of varying positions the model was subjected to winds up to 110 mph. A system of balance rods and control levers transferred the stresses and strains on the vessel to instruments on a control panel, where the readings were recorded.

So that the effects of wave forces on tankers moored in open water can be predicted more accurately, models were also tested in a laboratory tank where sea waves could be simulated. A 60-inch wooden model of a tanker capable of carrying 73,000 tons was moored by a single hawser to an electronic device which relayed stresses and strains to recording instruments.

By incorporating test results from the model tankers in the design of piers and moorings of the future, Esso engineers will be able to reduce the cost of constructing marine terminals for Esso affiliates throughout the world. It was realized that more information was needed for designing off-shore moorings for the largest tankers to withstand the forces encountered during storm conditions.

Much of the new research programme is being focused on the problem of corrosion, which has an annual cost for the tanker fleet operated by Jersey Standard affiliates of more than £7 million.

Other major aspects of the programme are the development and application of new piping and insulation materials and of more automatic techniques for loading and unloading tankers, including automatic gauging and remote control of valves.

Research at Imperial College

In the 1958–59 Annual Report of the Imperial College reference is made to the transport of liquefied natural gas in the *Methane Pioneer*. This is said to be a practical consequence of pioneering work on methane carried out in the Department of Chemical Engineering during the war years. In this connexion, work on the measurement of phase equilibria in the complex hydrocarbon mixtures constituting natural gas is in progress.

Work on measurement of friction and surface wear of solids has led to new correlations. In a quantitative theory of abrasive friction and wear, "ploughing" of the surface, and clogging by material worn off it, are factors of importance.

In the combustion field, work on slow combustion reactions has included the use of an isotope tracer to distinguish rates of attack of oxygen upon carbon-hydrogen bonds in hydrocarbon molecules.

In connexion with work on atmospheric pollution, a method of measuring small concentrations of oil droplets in air streams has been developed. It is being used in work on the elimination of oil from compressed air systems.

Faster Bunkering at Aden

As an addition to its present bunkering installations in Aden Harbour, BP (Aden) Ltd is laying two new fast bunkering terminals. For several months divers and workmen have been working on the new facilities.

Large passenger vessels, designed to reduce the time on the U.K.–Australia journey by approximately one week, are being built and consequently the bunkering time at stops must be reduced wherever possible.

To provide this new service BP has sunk two 16-in diameter pipes, each 2800 ft long, in Aden Harbour. After being assembled into 200 ft lengths on shore the pipes were made airtight, then launched and floated into position on pontoons, connected, and finally sunk to the bed of the harbour.

At the BP bunkering terminal at Steamer Point two new pumps have been installed which will be capable of pumping 1500 tons of fuel oil an hour through the new pipelines. Two new floating barges, complete with electric cranes to handle the heavier pipe terminals on to the ships, have been supplied from the United Kingdom and will work alongside both the new and older liners during bunkering operations.

Preparing to tow lengths of pipe into position in Aden Harbour

Ampol in 1959

Ampol Petroleum Ltd, of Australia, reports a great expansion in sales and activity during 1959. The high spot of the year was the introduction by the Company of an entirely new motor spirit—*Ampol Boron*. Sales and other revenue reached over £A32·5 million, an increase of 10·5 per cent on the preceding year.

The introduction of the new brand contributed to an increase in Ampol's motor spirit sales of 15·67 per cent, reaching a total of 128,879,926 gallons during the year under review. Total petroleum product sales were 195,367,831 gallons, an increase of 15·94 per cent over 1958.

The Company reports that the breakdown in its expenditure per £ was as follows:

	s.	*d.*
To suppliers of products	8	1¼
Government duties	4	6¼
Services and overheads	3	10½
Salaries and wages	1	3½
Provision for depreciation		5¼
Income tax		7½
Shareholders		10
Facilities and working capital		3¾

During the year Ampol controlled over 150,000 tons of shipping. A 32,250-ton tanker is under construction by the Broken Hill Proprietary Company Ltd at Whyalla, which when delivered in 1962 will be the largest ship ever built in Australia.

In the field of exploration, and the Company's holdings in WAPET operations, five wells (Meda Nos. 1 and 2, Goldwyer No 1, and Frome Rocks Nos 1 and 2) were completed. Some small shows of oil were revealed at each of these locations with the exception of Frome Rocks No 1. Thangoo No 1 was spudded in in November in the Kimberleys, about 50 miles south-east of Broome. It was later abandoned owing to cavernous conditions and a second well was begun nearby.

"British Destiny" Trials Completed

The oil tanker *British Destiny*, built at the Wallsend shipyard of Swan, Hunter & Wigham Richardson Ltd for BP Tanker Company Ltd, completed successful trials off the Tyne on 4 December.

The principal dimensions of the ship are as follows:—

Length between perpendiculars	665 ft
Breadth moulded	95 ft
Depth moulded to upper deck	51 ft
Deadweight 42,160 tons on	... 38 ft 8-inch draught
Gross tonnage	27,585 grt
Designed speed on service, fully loaded ...	16 knots
Cargo tank capacity 1,791,600 cu ft at 98 per cent full	
Oil fuel bunkers 98 per cent full	3938 tons

The ship is built to Lloyd's Register of Shipping highest class +100.A1 ("Oil Tanker") and to the latest requirements of the Ministry of Transport.

Gas in Industry

An exhibition illustrating "Gas At Work In Industry" will be held at the Royal Horticultural Hall, London, on 1-12 March. The second of its kind, the exhibition is sponsored by four of the Area Gas Boards—Eastern, North Thames, South Eastern, and Southern.

How gas continues to meet the demands of modern industry will be demonstrated by working plants, models, photographs, films, etc. Atomic energy, radar, television, aircraft, and rockets are among the industries which make use of gas.

There will be demonstrations of metal melting, tinning, diecasting, and special purpose plant for the clean heat treatment of metals. Another feature will be the vitreous enamelling of aluminium, of special interest as it will employ plant of new design. Drying operations by means of direct and indirect plant will be seen, and an infra-red plant will carry out paint finishing operations.

New Dining and Recreation Building at Birkenhead

On 8 December L. Soulal, the manager of Mobil Oil Company's Birkenhead works, was host to 60 guests, including the Mayors of Birkenhead and Wallasey and many local industrialists, who visited the works on the occasion of the opening of a new restaurant providing meals and recreational facilities for the 450 Mobil personnel working at Birkenhead.

On the ground floor of the new building the kitchen is directly linked and integrated with two dining halls, capable of seating 252 people at tables of four.

Recreational facilities on the first floor include a games room and a lounge. There is also a small dining room capable of seating 12 people.

The accent in the decor and design of the building is on modern styling. On the southern side, behind the main façade of brick, the building is almost completely glazed, while internally, colour is obtained wherever possible from the materials employed.

Safety, Health and Welfare in the Shipbuilding and Ship-Repairing Industries

The Ministry of Labour has published a statutory draft of a new code of special regulations* to replace the Shipbuilding Regulations, 1931. The draft regulations relate to repair and construction work carried out in harbours and wet docks (which is not subject to the 1931 regulations) as well as in shipyards and dry docks.

The purpose of the regulations is to safeguard the health and promote the safety and welfare of persons employed in the shipbuilding and ship-repairing industries. Among the new provisions in the draft regulations are requirements as to the fencing of dry docks, guard rails on staging, and precautions to be taken against explosions and fires on oil-carrying vessels. Provision is also made for the allocation of responsibility for the observance of the regulations.

The publication of the statutory draft provides an opportunity for those concerned to examine the requirements and consider whether they wish to object to any of them. Every objection must be in writing and state the specific grounds of objection and the omissions, additions, or modifications asked for. Objections may be addressed to the Secretary, Ministry of Labour, 8 St James's Square, London, S.W.1, and must be sent not later than 21 March 1960.

* *Shipbuilding and Ship-Repairing Regulations, 1960*, obtainable from HM Stationery Office, or any bookseller, price 1*s* 5*d* post free.

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DISTRIBUTION OF OIL

A course of five day-time lectures on "Distribution of Oil" will be held at Sir John Cass College, Aldgate, London, E.C.3, on 12–14 April, 1960.

Designed to outline distribution in its widest aspects, the course should appeal to those engaged on both commercial and non-technical, and technical, activities.

Fee for the course is £3 10*s*, and includes light refreshments and lunch on each day. Applications for enrolment should be made on the form obtainable from the Secretary of the College. The closing date for applications is 31 March.

World Oil Production in 1959

The production of crude oil throughout the world reached nearly 1000 million metric tons in the industry's centenary year. The total of 976,935,000 metric tons was an increase of 68,970,000 tons or 7·6 per cent over 1958, and virtually double the quantity produced a mere ten years ago. This increase was higher in 1959 than for any post-war year except 1955. This is the world output situation last year as estimated by the Petroleum Press Service, which adds, however, that the percentage growth in the non-Communist world as a whole was less than half that in the U.S.S.R. Total increase in production outside the Soviet bloc, in 1959, was nearly 50 million tons or about 6·6 per cent.

The expansion in world output in 1959 was widely spread over the various geographical areas, but the most spectacular increase was registered by Africa, whose output (excluding that of Egypt) rose by over 116 per cent to a level of 3,050,000 tons. Virtually half of the latter total was supplied by Algeria and the Sahara. Both the U.S.A. and Canada, which suffered decreases of 7·2 and 11·3 per cent respectively a year ago, have returned to their former steady growth with a rise of 5 per cent in the case of the U.S.A., and of 11·2 per cent for Canada, both countries showing increases in internal consumption after a period of recession. The other world area whose production declined in 1958 over 1957, that of the Caribbean, had an increase of 6·3 per cent in 1959.

Middle East crude oil production also broke records in 1959, attaining a level of 231,260,000 tons—a 7·7 per cent rise. Kuwait and Qatar were the only countries of the area to suffer a drop in output. In both cases the decline was small.

Production in Western Europe and the Far East both increased at a faster rate than was reported a year ago.

The Petroleum Press Service comments that from a long-term point of view the most significant happenings in 1959 were the increasing rate of production in the U.S.S.R. and the further development of the North African oil resources.

WORLD: ESTIMATED CRUDE OIL PRODUCTION
(Thousand Metric Tons)

	1957	1958	1959	1959 Per cent change 1958	1959 Per cent of world
NORTH AMERICA					
U.S.A.: West of Rockies	45,790	42,395	41,500		
East of Rockies	307,255	287,726	305,000		
	353,045	330,121	346,500	*5·0*	*35·5*
Canada	24,481	22,283	24,800	*11·2*	*2·5*
	377,526	352,404	371,300	*5·4*	*38·0*
LATIN AMERICA:					
CARIBBEAN AREA					
Venezuela	145,315	138,636	147,000		
Colombia	6,479	6,631	7,340		
Trinidad	4,905	5,342	5,750		
Cuba	56	49	30		
	156,755	150,658	160,120	*6·3*	*16·4*
OTHER COUNTRIES					
Mexico	12,491	13,331	13,500		
Argentina	4,542	5,114	6,700		
Brazil	1,321	2,473	3,150		
Peru	2,553	2,515	2,350		
Chile	565	726	870		
Bolivia	466	450	430		
Ecuador	421	406	380		
	22,359	25,015	27,380	*9·5*	*2·8*
MIDDLE EAST					
Kuwait	57,286	70,217	70,000		
Saudi Arabia	49,002	50,128	53,600		
Persia	35,500	40,590	45,500		
Iraq	21,880	35,670	41,700		
Qatar	6,648	8,222	8,150		
Kuwait Neutral Zone	3,328	4,258	6,000		
Egypt	2,362	3,165	3,600		
Bahrain	1,597	2,035	2,250		
Turkey	299	328	330		
Israel	70	89	130		
	177,972	214,702	231,260	*7·7*	*23·7*
AFRICA (EXCL. EGYPT)					
Algeria and Sahara	21	429	1,500		
Gabon	173	505	750		
Nigeria	—	300	600		
Angola	20	100	100		
Morocco	75	74	100		
	289	1,408	3,050	*116·6*	*0·3*
W. EUROPE					
Germany	3,960	4,432	5,120		
Austria	3,186	2,836	2,500		
Netherlands	1,523	1,621	1,800		
Italy	1,261	1,534	1,600		
France	1,410	1,386	1,550		
W. EUROPE—*continued*					
Yugoslavia	396	462	570		
U.K.	81	81	80		
	11,817	12,352	13,220	*7·0*	*1·3*
FAR EAST					
Indonesia	15,469	16,109	17,000		
Br. Borneo	5,590	5,269	5,500		
Burma	398	453	500		
India	429	420	420		
Japan	321	367	380		
Pakistan	309	303	315		
W. New Guinea	330	300	260		
	22,846	23,221	24,375	*5·0*	*2·5*
FREE WORLD					
U.S.A.	353,045	330,121	346,500	*5·0*	*35·5*
Remainder	416,519	449,639	484,205	*7·7*	*49·5*
	769,564	779,760	830,705	*6·6*	*85·0*
EASTERN EUROPE AND CHINA					
U.S.S.R.	98,340	112,900	129,000		
Rumania	11,180	11,336	11,500		
Hungary	675	829	1,050		
Albania	490	403	550		
Bulgaria	286	222	200		
Poland	181	175	170		
Czechoslovakia	110	110	110		
China (*a*)	1,460	2,230	3,650		
	112,722	128,205	146,230	*14·1*	*15·0*
WORLD TOTAL	882,286	907,965	976,935	*7·6*	

(*a*) Including oil from shale and coal.

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NEW THAMES DEPOT FOR PETROFINA

Petrofina (Gt Britain) Ltd has acquired, and are developing, a new distribution depot on the River Thames at Fulham.

As a result the Company has closed its Wandsworth and Dagenham depots. Fulham, which will be one of the most modern depots in the U.K., will handle all grades of motor spirit, derv, burning oil, vaporizing oil, diesel fuel, domestic fuel oil and gas oil.

The Kuwait Dinner

There was a capacity attendance of 120 members and guests on 14 January for the Eighth Annual Dinner of the Kuwait Branch, held at the Ahmadi Guest House of Kuwait Oil Company. After a superlative meal and following the raising of the loyal toasts by D. G. Hitt, M.B.E., Chairman of the Kuwait Branch, the gathering heard speeches which in context were both humorous and instructive. But first Mr Hitt read a cable which had been received from Kuwait Oil Company managing director the Hon. W. Fraser, regretting that he was unable to attend.

The Oil Industry

The first speaker was Sir George Middleton, K.C.M.G., Her Majesty's Political Resident, who proposed the toast of The Oil Industry.

During a period of some 30 years, Sir George said, in America, in India, and in the Middle East, he had had frequent contacts with the oil industry and thought he now knew the difference between a toolpusher and a driller.

Sir George paid tribute to the managerial and organizational skills in the oil industry and to the enormous capital expenditures which excited "awe and admiration". The industry could be particularly proud of its achievements.

Sir George thought the 1950's would be remembered for the political and social changes which they had seen rather than for "sputniks and moon-shots". The whole political map had undergone radical changes. The next decade would be far more technological in character and a tremendous challenge had to be met in the forecast increase in world population—500 million more by 1970.

There would be an enormous increase in the energy requirements of the world and for fuel to supply that energy. He foresaw tremendous developments in technology, and the oil industry, which itself would have to become highly competitive, had a major part to play.

Mr Scott replies

The reply to the toast was given by H. L. Scott, assistant general manager (P & R), Kuwait Oil Company, who thanked Sir George Middleton for having paid "our industry" such a nice compliment.

Mr Scott stressed the trends in the oil industry towards integration and decentralization with special emphasis on the manner in which the former encourages local competition.

The Institute

The toast to The Institute of Petroleum was given by G. T. Becker, chief geologist, K.O.C., who said that one of the most important functions of the Institute was to bring together all those who were part of, and interested in, the oil industry.

The original concept that an oilman had to show his affiliation by oil-stained clothing was passing. In present day operations it was fortunate for the geologists and petroleum engineers, the production and drilling people, the pipeliners and refiners, that there were specialists in oilfield materials, specialists in oilfield and marine transport, specialists in oilfield construction work, and specialists in oil accounting.

They were all working with a common purpose and towards a common goal. They were all oilmen and, Mr Becker concluded, "let us give thanks for the Institute of Petroleum as an organization which embraces all of us."

The President replies

Replying to the toast "The Institute of Petroleum" C. M. Vignoles, C.M.G., president of the Institute said:

"I bring from my Council and Members in London the warmest possible greeting to the Kuwait Branch. It is the first time that I personally have visited this area and I need not say how deeply impressed I have been by what the Kuwait Oil Company, working in co-operation and partnership with the host Government, have achieved over the last 14 years, and with what wisdom the Ruler and his Government are directing the benefits which inevitably accrue from such an operation to the general wellbeing of the people of Kuwait."

Mr Vignoles than spoke of the prospects for oil in the British Isles, the largest consumer in Europe, which draws 80 per cent of its present supplies from Kuwait. In giving the inevitable statistics, said Mr Vignoles, he would endeavour not to follow the "bikini" definition—"What they reveal is interesting but what they conceal is vital."

The oil demand in the British Isles was broadly based and last year the overall rate of expansion was 14 per cent. Oil

Among those present at the dinner were: O. A. Seager, Aramco; *E. E. Dawson*, Aminoil; *W. C. Buie*, K.O.C.; *R. E. Zagst*, Aminoil, and chairman, Saudi Arabian Section, Society of Petroleum Engineers; *V. J. Chir*, past-chairman, IP Kuwait Branch; *A. A. Mieras; A. G. T. Taylor*, assistant general manager (Management Services), K.O.C.; *L. J. Dawson*, H.M. Political Agent's representative, Mina-al-Ahmadi; *Air Chief Marshal Sir Hubert Patch; F. E. A. Thompson*, Iranian Oil Refining Co.; *E. Boaden, O.B.E.*, deputy general manager, K.O.C.

The toast of the Institute of Petroleum was proposed by G. T. Becker, chief geologist, K.O.C. (standing, left) *and replied to by C. M. Vignoles, C.B.E.*, IP President, *while the toast of The Petroleum Industry was proposed by Sir George Middleton, K.C.M.G.*, H.M. Political Resident, Persian Gulf. *Seated are:* (left) *Sayyid Ibrahim Mullah*, Government of Kuwait; *J. Khalili*, National Iranian Oil Co.; *M. P. O'C Tandy*, K.O.C.; (right) *Sayyid Ahmad Omar*, Government of Kuwait; *J. C. Richmond, C.M.G.*, H.M. Political Agent in Kuwait; *L. T. Jordan, C.B.E.*, general manager, K.O.C.; *D. G. Hitt, M.B.E.*, chairman Kuwait Branch and assistant general manager (Refining and Marine), K.O.C.; *C. M. Vignoles*

still only accounted for some 15 per cent of total energy demand.

Demands were being made for a limitation on oil usage in the face of declining coal requirements but the Government stood firm in favour of freedom of choice for the industrialist. Moreover the stability of oil prices relative to those of coal over the years had assisted the trend to oil.

"Britons need no longer freeze in their homes", said Mr Vignoles. There had been a spectacular development in the use of free-standing heating appliances burning kerosine, and there was a growing use of installed domestic central heating.

Mr Vignoles spoke also of the extended use of oil products in the gas industry and described current features in the motor spirit market in the British Isles.

Fuels were wanted not for themselves but for the power, heat, or comfort which they provided. Britain operated an economy which was by tradition coal-based. The advent of oil was welcomed and approved in the expanding use of road transport, in the use of diesels on the railways, and in home, factory, and office for heating.

But the remnants still remained of an attitude of resentment that oil in other uses was infringing upon the preserve of a familiar and respected fuel, coal.

Mr Vignoles continued: "So, in spite of the encouraging picture of consumption possibilities that I hope I have given you, over the whole oil industry hangs the somewhat lowering cloud of an over expansion of production against short term immediate demand. Mr William Fraser in his recent talk told you something of this; and to keep our share of the markets, and so your share of the production, we are all going to have to fight very hard and inevitably our financial returns will suffer in the process, so what is the greatest contribution we can all make to this problem?—Above all improved efficiency and the avoidance of all unnecessary additional charges on our operations."

Finally Mr Vignoles spoke of the activities of the Institute of Petroleum and said how gratifying it was to see many Companies and nationalities represented at the dinner and

H. L. Scott (standing, left), assistant general manager (Personnel and Relations), K.O.C., *replying on behalf of the Industry. The toast of The Guests was proposed by the chairman, D. G. Hitt* (standing, centre) *and replied to by J. C. B. Richmond. Those seated are* (left) *Sayyid Ashraf Latfi*, Government of Kuwait; *E. E. Dawson*, general manager, Aminoil; *Air Chief Marshal Sir Hubert Patch, K.C.B.; L. T. Jordan;* (right) *Air Chief Marshal Sir Hubert Patch, K.C.B.; Sayid Ahmad Omar; L. T. Jordan, C.B.E.; Sir George Middleton, K.C.M.G.*

to learn that the Kuwait Branch was so active and virile. He hoped that when members were in Britain they would spend a little time at the Institute's beautiful new premises, where they would be made very welcome.

The Guests

In proposing the toast to The Guests, the chairman, D. G. Hitt, M.B.E., assistant general manager (R & M) Kuwait Oil Company, said "how happy we are to have with us distinguished members of the Kuwait Government" in the persons of Sayyids Bader Abdulla Mulla, Ahmad Said Omar, Ashraf Lutfi, and Ibrahim Mulla, and D. C. McGregor. He hoped they had enjoyed the proceedings and said how much "we, the members of the Kuwait Branch, appreciate working here as guests in their country".

They were honoured to have with them the Political Resident, Sir George Middleton, and Air Chief Marshal Sir Hubert Patch, K.C.B., both of whom were attending for the first time; also J. C. B. Richmond, C.M.G., the Political Agent for Kuwait whom "we wish a successful term of office".

They welcomed as an old friend, Talcott Seelye, representing the Government of the U.S.A., and were particularly proud also that C. M. Vignoles, their President, could be with them.

They welcomed also Messrs Khalili and Torabi representing the Iranian Institute of Petroleum.

Mr Hitt thanked the Company for the use of the dining room, Mr Jordan for his continued support, and Messrs Porter and Brown for their magnificent efforts without which the dinner would not have been possible.

On behalf of The Guests, H.M.'s Political Agent in Kuwait, J. C. B. Richmond, C.M.G., thanked the Chairman for his kind words and the Branch for its hospitality, in a very witty speech.

Lectures, Courses, and Conferences

Flame Arresters and Relief Vents Symposia

The accompanying photograph shows some of the apparatus used for demonstrations which were part of an informal Symposia on flame arresters and relief vents which was held at the Fire Research Station, Boreham Wood, of the DSIR and Fire Offices Committee Joint Fire Research Organization, on 19 and 20 November.

A programme of research into the performance of these arresters and vents is in progress at Boreham Wood, and the Symposia, which was attended by about 90 participants from Government organizations and industry, was instituted to discuss some of the results obtained so far. Papers were presented by K. N. Palmer on "Flame Arresters for Industrial Use" and by Dr D. J. Rasbash on "Explosion Reliefs for Gas and Vapour Explosions."

In a series of lively discussions many important points were raised, including the use of flame arresters for storage tanks for flammable liquids, the need for certification of flame arresters, and the need for information on the use of relief vents for protecting reaction vessels and for reducing flame speed along ducts. It is intended to publish the proceedings of the Symposia in the near future.

"Micro Gas Analysis"

At a Joint Meeting of the Midlands Section and the Microchemistry Group of the Society for Analytical Chemistry, held on 12 January in Birmingham, a paper on "Micro Gas Analysis", by G. J. Minkoff, D.Sc., D.I.C. (Chemical Division, BP Research Centre, Sunbury-on-Thames), was presented and discussed. It was said that the analysis of gases could be sub-divided in many ways depending on the scale of the operation. With micro analysis, there was an extra complication in that the gas to be estimated might either be present in a very small volume, or it might be a very minor constituent of a comparatively large sample. Thus, in static gas kinetic studies, and in oxidation reactions in which the conversion was small, the sample might consist of a very small volume containing permanent gases in varying proportions. On the other hand, a problem often encountered was the detection of dangerous concentrations of gases under conditions which required reliability rather than accuracy. The presence of inflammable gases in quantities, although small, yet large enough to give rise to an explosive hazard, formed one category, and the detection of noxious gases another. Some chemical and classical methods which had been developed for these purposes were described.

Recent years had seen a rapid growth in modern techniques such as infra-red spectroscopy, mass spectroscopy, and gas chromatography. Although in many cases it was not profitable to expend the large amounts of money required, it nevertheless often happened that those methods were available, and it was therefore advantageous to realize their potentialities. The rest of the lecture was devoted to discussing these, together with their limitations.

"The Computer in Production"

The Institution of Mechanical Engineers is arranging an informal discussion on "The Computer in Production" on 21 and 22 March 1960, commencing at 10 a.m. Several distinguished engineers and users of computers will give talks on the subject, and visits to computer centres, and to installations where computers are being used on production problems, will be arranged.

The meeting will be open to members and visitors, and is aimed primarily at management level; but the subject treatment is also likely to be of interest to specialists in computers.

Those who wish to attend the meeting should apply to The Secretary, The Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London, S.W.1.

Petroleum Trade of the United Kingdom in 1959

Total imports into the U.K. of crude petroleum and liquid petroleum products were 13,541 million gallons in 1959, according to the official preliminary report*. This was an increase of 16·6 per cent over the total for the preceding year, and of 34 per cent over 1957.

Details for individual products are set out in Table I, and it will be seen that, of the total quantity, 10,207 million gallons was crude and partly refined petroleum—a 16·8 per cent increase over the figure for 1958. All categories of liquid petroleum products showed an increase over the previous year, with the sole exception in the case of spirit other than motor spirit. In addition, imports of all solid products individually enumerated increased, with petroleum wax other than paraffin wax being a particularly notable case in point. The value of petroleum products not elsewhere specified fell from £4295 million to £2978 million in 1959, returning to a similar level to that registered in 1957.

Value of Imports

In regard to cif values of oils imported into the U.K., Table III shows that for 1959 there were decreases compared to 1958 for every liquid product except kerosine and gas oil, and for every specified solid product except petrolatum.

*Trade and Navigation Accounts of the United Kingdom, December 1959. H.M.S.O. 22*s* 6*d*.

Bunker Oils

Oil fuel taken on board vessels in the foreign trade, and by fishing vessels, for their own use totalled 961,970,000 gallons in 1959, compared with 901,917,000 gallons in 1958. Of these amounts, the quantities taken by vessels under the British flag were 688,796,000 gallons in 1959 and 658,002,000 gallons in the previous year.

Consigning Countries

In the list of countries of consignment, which are not necessarily the countries from which the import originated, it is noted that particularly noteworthy increases in petroleum

TABLE II
PERCENTAGE IMPORTS OF PETROLEUM INTO THE U.K.

	1959	1958	1957
Crude petroleum	75·5	75·2	71·7
Motor spirit	6·5	6·2	7·3
Other spirit	0·2	0·3	0·8
Kerosine	2·7	2·7	4·1
Gas oil	4·1	4·5	5·5
Diesel oil	0·4	0·2	0·5
Fuel oil	9·5	10·0	9·1
Lubricating oil	1·1	0·9	1·0
	100·0	100·0	100·0

TABLE I
QUANTITY AND VALUE OF U.K. PETROLEUM IMPORTS

	1959		1958		1957	
	Quantity 1000 *gal*	*Value* £	*Quantity* 1000 *gal*	*Value* £	*Quantity* 1000 *gal*	*Value* £
Crude petroleum:						
Full and topped crudes	9,979,143	303,865,384	8,449,394	281,521,721	6,942,044	264,874,621
Other†	228,012	9,746,189	290,967	13,121,262	301,390	15,334,771
	10,207,155	313,611,573	8,740,361	294,642,983	7,243,434	280,209,392
Refined petroleum:						
Motor spirit‡	876,276	47,065,530	721,219	40,079,052	743,227	46,244,315
Other spirit	34,536	2,259,553	36,096	2,522,667	78,942	4,968,524
Kerosine	364,197	18,238,314	313,829	15,086,140	413,014	22,318,461
Gas oil...	555,434	25,932,518	523,435	24,171,086	558,429	30,466,674
Diesel oil	60,919	2,651,002	22,101	1,026,882	46,732	2,300,779
Fuel oil	1,288,591	37,915,238	1,154,758	37,008,325	916,571	36,171,463
Lubricating and other heavy oils	154,101	12,159,491	102,719	9,771,214	100,643	10,940,953
TOTAL	13,541,209	459,833,219	11,614,518	424,308,349	10,100,992	433,620,561
	Cwt		*Cwt*		*Cwt*	
Petrolatum	111,116	477,933	109,524	438,364	166,356	582,332
Waxes:						
Paraffin wax	647,914	2,145,812	604,597	2,035,814	671,615	2,348,029
Other petroleum wax	1,052,413	1,417,908	139,092	717,270	139,751	737,920
All other refined petroleum products, not elsewhere specified, and pitch (excluding natural asphalt and bitumen)	—	2,978,215	—	4,295,092	—	2,910,200
TOTAL	—	£466,853,087	—	£431,794,889	—	£440,199,042

†Includes refinery feed but excludes unfinished oil for blending.
‡Including blending components.

TABLE III

AVERAGE CIF UNIT VALUES OF U.K. PETROLEUM IMPORTS

	1959	1958	1957
	£ *per* 1000 *gal*		
Full and topped crude ...	30·45	33·32	38·16
Other crudes	42·75	45·10	50·89
Motor spirit	53·71	55·57	62·22
Other spirit	65·43	69·93	62·94
Kerosine	50·08	48·07	54·04
Gas oil	46·69	46·18	54·56
Diesel oil	43·52	46·46	49·21
Fuel oil	29·41	32·05	39·57
Lubricating oil	78·91	95·13	108·71
	£ *per cwt*		
Petrolatum	4·30	4·00	3·50
Paraffin wax	3·31	3·37	3·50
Other petroleum wax ...	1·35	5·16	5·28

imports in 1958 came from Bahrain, Qatar, and the Trucial States; Trinidad; Colombia—with crude petroleum consignments of eight times those of the previous year; Sarawak; and other Commonwealth countries and the Irish Republic. Countries with a decreased volume of consignments to the U.K. in 1959 were the Netherlands, U.S.A., Saudi Arabia, France, Aden, and the U.S.S.R.

In Table V the statistics relating to the various areas of origin can be seen at a glance. Whilst the Middle East's share of supply has dropped slightly, that of the Latin American area has risen. Europe's increased participation of 1958 has not been continued, whilst a strong proportionate increase has been registered of supplies from undisclosed areas.

TABLE IV

COUNTRIES CONSIGNING PETROLEUM TO THE U.K.

Country and Product	*Thousand gallons*		
	1959	1958	1957
KUWAIT:			
Crude petroleum	4,256,171	4,003,432	3,628,807
VENEZUELA:			
Crude petroleum	1,373,429	1,169,436	1,349,825
Kerosine	35,414	41,606	67,504
Gas, diesel, and fuel oils ...	427,223	215,251	157,869
Lubricating oil	13,430	14,159	14,459
	1,849,496	1,440,452	1,589,657
IRAQ:			
Crude petroleum	1,694,786	1,459,983	269,686
IRAN:			
Crude petroleum	1,497,421	1,327,989	625,264
Motor spirit	18,478	15,913	66,735
	1,515,899	1,343,902	691,999
BAHRAIN, QATAR, AND TRUCIAL STATES:			
Crude petroleum	404,310	184,483	306,169
Motor spirit	110,372	115,412	63,979
Kerosine	36,130	25,381	16,518
Gas, diesel, and fuel oils ...	131,346	80,992	32,726
	682,158	406,268	419,392

TABLE IV—(CONTD.)

COUNTRIES CONSIGNING PETROLEUM TO THE U.K.—(CONTD.)

Country and Product	*Thousand gallons*		
	1959	1958	1957
TRINIDAD:			
Crude petroleum	1,089	—	23,311
Motor spirit	230,018	131,501	137,481
Kerosine	44,868	50,112	60,423
Gas, diesel, and fuel oils ...	342,892	185,597	186,381
	618,867	367,210	407,596
NETHERLANDS:			
Crude petroleum	25,795	52,814	77,568
Motor spirit	70,009	82,655	68,768
Kerosine	107,667	103,237	77,194
Gas, diesel, and fuel oils ...	338,375	519,739	194,939
Lubricating oil	26,643	13,900	11,113
	568,489	772,345	429,582
NETHERLANDS ANTILLES:			
Crude petroleum	99,004	160,746	119,569
Motor spirit	133,624	80,068	80,309
Kerosine	82,907	69,227	113,339
Gas, diesel, and fuel oils ...	162,570	120,370	217,432
Lubricating oil	24,356	22,310	22,552
	502,461	452,721	553,201
COLOMBIA:			
Crude petroleum	304,065	40,701	71,277
U.S.A.:			
Crude petroleum	14,116	15,477	490,784
Motor spirit	50,522	59,383	133,133
Kerosine	2,754	3,053	22,178
Gas, diesel, and fuel oils ...	83,398	108,829	457,759
Lubricating oil	39,460	39,001	42,244
	190,250	225,743	1,146,098
SAUDI ARABIA:			
Crude petroleum	158,704	190,746	161,959
Gas, diesel, and fuel oils ...	7,883	31,953	—
	166,587	222,699	161,959
SARAWAK:			
Crude petroleum	151,845	47,105	60,760
ITALY:			
Motor spirit	32,040	22,230	7,720
Gas, diesel, and fuel oil ...	80,254	85,570	35,536
	112,294	107,800	43,256
FRANCE:			
Motor spirit	37,851	15,986	10,756
Kerosine	590	2,556	1,757
Gas, diesel, and fuel oils ...	57,327	103,640	21,635
Lubricating oil	3,682	3,202	2,189
	99,450	125,384	36,337
ADEN:			
Motor spirit	35,286	63,457	122,938
Kerosine	32,932	15,061	35,919
	68,218	78,518	158,857
PERU:			
Crude petroleum	34,708	30,217	31,454

TABLE IV—(CONTD.)

COUNTRIES CONSIGNING PETROLEUM TO THE U.K.—(CONTD.)

Country and Product	Thousand gallons		
	1959	1958	1957
WESTERN GERMANY:			
Gas, diesel, and fuel oils...	11,546	6,167	36
SOVIET UNION:			
Lubricating oil	7,407	7,876	6,924
OTHER COMMONWEALTH COUNTRIES AND IRISH REPUBLIC:			
Crude petroleum	134,201	32,444	—
Motor spirit	6,906	2,989	2,064
Kerosine	578	41	412
Gas, diesel, and fuel oils...	110,404	75,542	54,191
Lubricating oil	28,404	322	566
	280,493	111,338	57,233
OTHER FOREIGN COUNTRIES:			
Crude petroleum	57,111	24,788	1
Motor spirit	151,170	131,625	49,344
Kerosine	20,357	3,555	17,770
Gas, diesel, and fuel oils...	151,726	166,644	163,228
Lubricating oil	10,719	1,949	596
	391,083	328,561	230,939

Re-Exports

Comparatively small quantities of the products imported into the U.K. are re-exported, and details are shown in Table VI.

Exports of Home-Produced Oil

The exports from the U.K. in 1959 of home-produced liquid petroleum products were 50,162,000 gallons less than the total for 1958, and 437,047,000 gallons more than that for 1957. This overall decrease in the latest year was repeated in the case of most of the individual liquid products, although larger quantities of kerosine, gas oil, and lubricating oil (particularly) were exported in 1958. Details can be seen in Table VII.

Average unit values of these exports in £ per 1000 gallons were: motor spirit £47·6 (£49·5 in 1958); other spirit £101·5 (£111·0); kerosine £46·0 (£43·38); gas oil £41·5 (£42·1); diesel oil £37·0 (£37·5); fuel oil £23·0 (£25·8); lubricating oil £160·0 (£172·5); and in £ per cwt, lubricating greases £4·5 (£4·3); and, £ per ton, bituminous asphalts £30·2 (£26·1); pitch £12·9 (£12·7).

TABLE V

U.K. PETROLEUM IMPORTS BY ZONES OF CONSIGNMENT

	1959		1958		1957	
	Mil. gal	*% of total*	*Mil. gal*	*% of total*	*Mil. gal*	*% of total*
Middle East ...	8384	62·1	7515	64·9	5358	54·0
Caribbean and Peru	3310	24·5	2331	20·1	2553	25·7
Europe	799	5·9	1020	8·8	516	5·2
United States ...	190	1·4	226	2·0	1146	11·6
Far East	152	1·1	47	0·4	61	0·6
Undisclosed areas ...	672	5·0	440	3·8	288	2·9

TABLE VI

U.K. RE-EXPORTS OF IMPORTED PETROLEUM

	1959	1958	1957
	Thousand gallons		
Motor spirit	20,542	35,296	28,827
Gas, diesel, and fuel oils ...	90,293	61,137	14,735

TABLE VII

U.K. EXPORTS OF HOME-PRODUCED AND HOME-MANUFACTURED PETROLEUM

	1959		1958		1957	
	Quantity 1000 *gal*	*Value* £	*Quantity* 1000 *gal*	*Value* £	*Quantity* 1000 *gal*	*Value* £
Motor spirit	537,470	25,584,562	577,929	28,611,986	449,297	26,491,982
Other spirit	10,260	1,040,906	10,878	1,207,677	4,711	534,624
Kerosine	97,229	4,472,935	76,243	3,289,325	59,952	3,027,493
Gas oil	444,437	18,392,522	435,858	18,348,896	209,442	10,180,733
Diesel oil	115,364	4,265,117	126,073	4,728,559	100,572	4,343,583
Fuel oil	684,826	15,763,223	726,969	18,923,917	646,644	20,759,464
Lubricating oil	113,273	18,128,398	99,071	17,092,011	95,194	17,552,881
TOTAL	2,002,859	87,647,663	2,053,021	92,202,371	1,565,812	82,890,760
	Cwt		*Cwt*		*Cwt*	
Lubricating greases and compounds (including cable-impregnating compounds) ...	532,738	2,377,518	598,407	2,572,164	585,475	2,630,845
	Tons		*Tons*		*Tons*	
Bituminous asphalts (manufactured) and emulsions (other than for use as paint) ...	49,656	1,501,553	65,960	1,720,105	74,481	1,823 932
Pitch (other than natural asphalt and bitumen)	169,399	2,182,156	183,068	2,319,206	235,597	2,647,703
All other refined petroleum products not elsewhere specified, and crude petroleum ...	—	1,729,622	—	629,564	—	868,522
TOTAL	—	£95,438,512	—	£99,443,410	—	£90,861,762

Standardization Chairman Retires

FAREWELL TO F. L. GARTON

F. L. Garton receiving the pipes and tobacco pouch from the President and—

—exhibiting the five pipes which are to help him enjoy his retirement

Members of the Standardization Committee met at a luncheon on 26 January to bid farewell to their retiring chairman F. L. Garton, who on retiring from the petroleum industry is proceeding to the United States to take up residence there. The chair was taken by the President of the Institute, C. M. Vignoles, who in a short speech expressed his pleasure at being asked to do so on this occasion.

The President outlined Mr Garton's career from his entry into the petroleum industry with the Shell Group in 1923. From 1924 to 1929 he was a chemist at the Lutong refinery of Sarawak Oilfields Ltd. From there he had proceeded to the Wood River refinery of Shell Petroleum Corporation to become the associate director of its research laboratory in 1935. Since returning to the U.K. in 1939 he had served Shell in various capacities and from 1951 had been mainly concerned with training and career development of overseas technical marketing staff.

As far as the IP was concerned Mr Garton joined the Institute in 1926 and had served as a member of its Council since 1949. He first joined the Standardization Committee in 1946 and had been its chairman since 1951. Under his farseeing guidance the high quality of IP standard methods had been maintained and the Committee had been kept fully abreast of current trends in petroleum technology. Under the chairmanship of Mr Garton the work of Standardization had proceeded very smoothly, and there had never been any real disagreements as to the decisions taken. This was largely due to Mr Garton's charm and tact which had endeared him to all and made him a friend to all. He had a marked ability to bring together opposing viewpoints and the re-organization of the work and constitution of the Committee and its sub-committees which had recently been made, were a tribute to Mr Garton's patience and foresight. He was sure he was expressing the feelings of them all in wishing Mr Garton a long and happy retirement in his new home. It was with very great pleasure that he asked him to accept from his colleagues on the Standardization Committee a small token of their affection and appreciation of him. The President then presented him with a case of five Dunhill pipes and a tobacco pouch.

Mr Garton said he was overwhelmed by the event and was particularly honoured and gratified that the President had found it possible to give his time to be in the chair that day. He thanked him for the kind things he had said, and said that he could not have wished to have worked with a better committee or to have had a better deputy chairman than Bill Thomas. The main work of Standardization was carried out by the members of the Committee, its sub-committees

Among those present at the Garton lunch were (left to right) *S. A. Berridge, W. F. Jelffs, F. L. Garton, W. H. Thomas, H. M. Glass, C. Chilvers, W. E. J. Broom, F. L. Garton, R. Sefton, D. L. Samuel, G. A. Dickins, H. Hyams, F. L. Garton, W. Pohl, H. Gardner, M. M. Lapitzky*

and its panels, and throughout he had enjoyed excellent support from everyone, and his term of office as chairman had been that much easier.

He was particularly grateful for the gift of pipes which had been made to him, and he felt that those who had chosen the gift must have been as well acquainted as he was with the difficulty of obtaining good pipes in the United States.

As they knew, Mr Garton said, he was planning to move to the United States and he would be particularly pleased if any of them would pay him a visit if they were in that country at any time. He would let the IP know his exact address when he had made his final choice. Concluding he again said how much he had enjoyed his work on Standardization and he hoped that work would go from strength to strength. He wished them all happiness in the future.

W. H. Thomas speaking on behalf of the Standardization Committee said they were all conscious of the loss of a great leader and counsellor. Mr Garton's personal charm had always ensured the smooth running of the work, and the large attendance at their meetings was a clear indication of his great skill as chairman. The meetings had always presented opportunity for the frank discussion of Standardization affairs and had invariably concluded with a sense of achievement. In Mr Garton they had had a wonderful friend and he left the Committee with a new organization which would work even more smoothly in the future. He took with him the good wishes of all.

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5th W.P.C. PROCEEDINGS

Proceedings of the Fifth World Petroleum Congress are now available, and are being mailed to those who placed orders in advance.

A limited number of copies are available for sale from the American Petroleum Institute's Publications Offices, 1271 Avenue of the Americas, New York 20, New York. They are priced at $12.50 per volume, plus $.50 for handling and mailing, or $110.00 plus $5.50 for the complete set of eleven volumes. There is a special price to Congress members of $7.50 per volume or $70.00 for a complete set (no handling charge).

The Proceedings consist of eleven volumes varying in size up to the 1120 pages of Vol I, and make a total of 4640 pages. There is a separate volume containing the technical papers and discussions for each of the ten Sections of the Congress. The General volume describes the organization and events of the Congress and contains the general lectures, speeches, and a list of all Congress members and their addresses.

The technical volumes represent an unparalleled collection of up-to-date information supplied by outstanding leaders in the various fields of petroleum technology. As such, they are extremely valuable references for those working in these fields. The volumes are:

Volume	*Subject*	*No. of Papers*
I	Geology and Geophysics	57
II	Drilling and Production	31
III	Oil Processes and Refining	32
IV	Chemicals from Petroleum and Natural Gas	29
V	Composition, Analysis and Testing	31
VI	Utilization of Petroleum Products	29
VII	Engineering, Equipment and Materials	22
VIII	Transportation and Distribution	19
IX	Operations Research, Statistics and Education	14
X	Symposium on the Applications of Atomic Energy to the Petroleum Industry	18

World Tanker Fleets

The world total of oil tankers in 1959 increased from a year ago by 4,300,000 tons gross to an aggregate of 37,890,000 grt, according to *Lloyd's Register of Shipping Statistical Tables 1959*, based on the Register of July of last year.

This total of world tankers represents 30·3 per cent of all steamships and motorships, as compared with 28.5 per cent a year ago. The figure consists of 21,563,761 grt of steamships—of which 1,285,560 have reciprocating engines and 20,278,201 turbine engines—and 16,325,923 grt of motorships.

Liberia has taken Great Britain's place as the leading country of ownership, with a total of 426 ships of 7,077,646 grt, a rise of 1,459,000 tons over that country's figure for 1958. Great Britain is in second place with 836 vessels of 6,389,275 grt, followed by Norway (543 of 5,928,706 tons) and the U.S.A. (472 of 4,339,956).

Liberia's increase in tanker ownership over the last twelve months is the largest represented by any country. The next countries in order of succession are Norway and Great Britain, with increases of 575,000 and 461,000 tons respectively. Further details can be seen in the table below.

World Tanker Fleets 1959

100 gross tons and over

Country of Ownership	*Number*	*Tons gross*
Great Britain and N. Ireland	836	6,389,275
Other Commonwealth	119	316,827
United States	472	4,339,956
Argentina	58	341,962
Belgium	14	169,150
Brazil	37	209,956
Chile	3	23,702
China	19	71,538
Costa Rica	2	8,397
Denmark	75	807,057
Egypt	3	23,675
Finland	21	157,348
France	151	1,679,048
Germany	108	544,249
Greece	47	325,944
Honduras	3	8,637
Iceland	4	13,839
Indonesia	5	9,342
Irish Republic	4	27,314
Israel	3	27,496
Italy	201	1,605,894
Japan	399	1,302,209
Liberia	426	7,077,646
Mexico	19	127,361
Netherlands	144	1,247,655
Norway	543	5,928,706
Panama	199	2,560,604
Peru	10	33,892
Philippines	5	3,711
Poland	10	63,279
Portugal	13	98,744
Spain	56	385,272
Sweden	174	1,304,573
Turkey	14	64,783
Uruguay	5	23,847
Venezuela	28	162,838
Yugoslavia	5	26,217
Other Countries	106	377,741
WORLD TOTAL	4,341	37,889,684

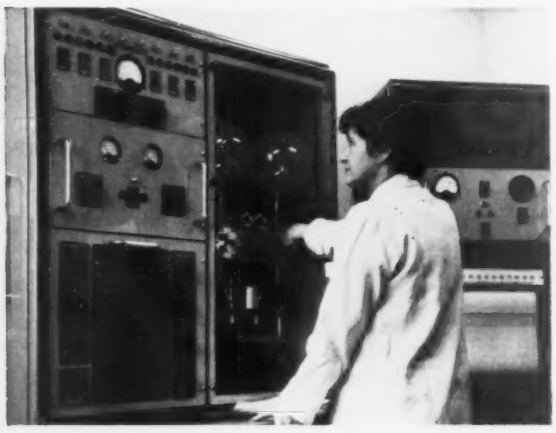
Llandarcy Refinery's New Laboratory

On 8 December the new laboratory at The British Petroleum Company's Llandarcy refinery was formally opened by Dr S. F. Birch, D.I.C., F.Inst.Pet., one of the BP Group's senior Research Associates.

The building, work on which commenced early in 1956, was completed in May 1959 at a cost of £382,000. Its eighteen offices and twenty-five laboratories are occupied by one hundred and twenty graduate chemists and engineers, analysts, and technical assistants. The main building comprises a double-storey block, with three single-storey wings. The ground floor accommodation consists mainly of laboratories, whilst on the upper floor there are offices, a conference room, and a technical library. At the rear of the main building are three ancillary buildings, including an engine test house which has five test bays, a workshop, and a reference store.

Every modern feature has been incorporated in the design of the laboratory, most of the bench tops are surfaced with light-coloured plastic, and oil sinks simplify the disposal of waste oil. Heating is provided above false ceilings and extensive air-conditioning has been installed.

The mass spectrometer apparatus



The laboratory itself consists of a number of separate rooms, each allocated to a specific task, such as examination of products, mass spectrometry, instrumental methods of analysis, works control, process development, etc. The first laboratory was established in the building which now houses the engineering and process control staffs, first occupying part of that building and later expanding to take in the entire premises. There have been at least three phases of expansion into temporary and new accommodation in the 38 years' existence of the refinery.

A large gathering of staff and visitors were present at the official opening and later made a tour of the laboratories. Among the visitors were local civic dignitaries, professional staff of Cardiff and Swansea Universities, members of the Press, and senior members of the BP staff in London.

At the luncheon given during the visit, the guests were welcomed by the general manager of the refinery, R. B. Southall, C.B.E., F.Inst.Pet., who paid tribute to Dr Birch for his valuable work in the field of petroleum chemistry. In an often amusing reply Dr Birch described some of his experiences when working at Llandarcy in 1924 as a very junior chemist, and remarked how valuable his refinery training had proved to be in later years.

He recalled that the laboratories of those early days were rather primitive, consisting of part of a wax stores which had been partitioned off, and constructed of asbestos sheeting. Some time later, when a new office block was built, the original building was entirely converted into improved laboratories, for Llandarcy was increasingly being used to try out new plants and processes. It was said that among the plants first tried out at Llandarcy were the Cafco process, the vapour distillation unit, ELOP, the Dubbs and Cross cracking plants, SO_2 extraction, the so-called decarbonization process (a forerunner of catalytic cracking), and, more recently, Autofining. The commissioning of all these involved much laboratory work, which, although never regarded as research, did indeed come under that heading.

Dr Birch concluded by saying that the laboratories which had been officially opened that day were intended not only to improve the facilities for analytical control, testing, and development work, but to include a certain amount of research work. Experience had shown that certain problems could

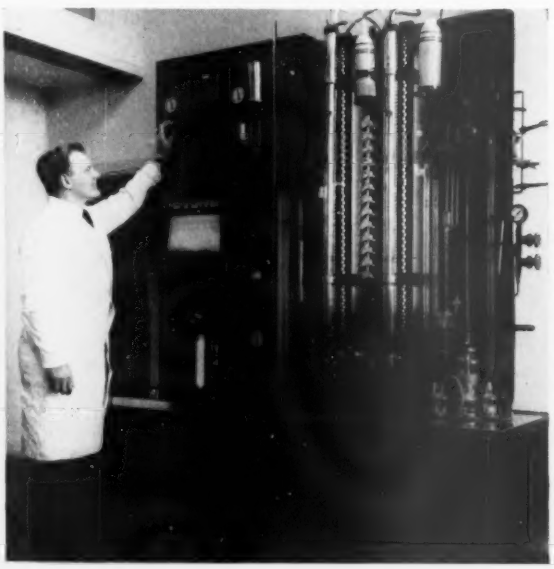
Dr Birch formally opening the main doors of the new laboratory

best be studied where they arose and where there was the greatest interest in them. Llandarcy, for example, was one of the major wax-producing centres of the Company, and it was now felt that this was the place to do most of the investigatory work on wax production and quality, since chemists there were in touch with the problems involved. This was in many ways a very considerable change in policy, involving as it did a certain degree of decentralization of research. It did not, of course, mean that research on wax would only be restricted to Llandarcy.

Again, it was thought that work on what was an increasingly mathematical approach to the modern trend of higher operating efficiency in the refinery could best be worked out on the spot rather than in a remote research centre.

It was also realized that chemists tended to find the more routine type of work, which was so essential to keep the refinery going, tedious. Encouragement to do work of a more investigatory nature would undoubtedly provide a very great stimulus to those so inclined. Recent work done at Llandarcy on biological oxidation of a refinery effluent was, in itself, a fine piece of research of the kind hoped for in the future.

Gas analyser apparatus



IP EXPLORATION AND PRODUCTION GROUP

The second meeting of the Exploration and Production Group will be held at 61 New Cavendish Street, London, W.1, at 5.30 p.m. on Thursday, 31 March, when F. E. Wellings (*Iraq Petroleum Co. Ltd*) will speak on "Middle East and Sahara. Technical Comparisons of Oil Potentialities".

It is proposed to hold an all-day symposium on Friday, 24 June, when papers on the following subjects will be presented:

(i) Geophysical
(ii) Drilling
(iii) Well logging
(iv) Flow of oil and gas mixtures in horizontal pipes.

Further details will be issued later.

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Scottish Petroleum Consumption

Deliveries into inland consumption of petroleum products in Scotland totalled 2,237,817 tons during the period January—September 1959, according to statistics released by the Petroleum Information Bureau on behalf of the Petroleum Industry Advisory Committee.

This was an increase of 218,983 tons over the corresponding period of 1958. Within the total, increases were registered for every product with the exceptions of white spirit (a drop in the third quarter), vaporizing oil, and paraffin wax and scale. The category of "other products" recovered in the third quarter of the year from a decrease over the January–June period.

Details can be seen in the following table.

SCOTTISH DELIVERIES INTO INLAND CONSUMPTION OF PETROLEUM PRODUCTS

Product	*January to September*	
	1958	1959
	tons	*tons*
Aviation fuels	98,587	141,500
Motor spirit (incl. motor benzole):		
Premier grades	227,603	266,235
Standard grades	173,419	162,226
	401,022	428,461
Industrial spirits (incl. industrial benzole)	30,295	34,875
White spirit	6,008	5,999
Kerosine:		
Burning oil	49,357	49,482
Vaporizing oil	36,303	28,481
	85,660	77,963
Derv fuel...	174,247	187,931
Gas, diesel, and fuel oils:		
Gas/diesel oil	227,983	249,509
Fuel oil	447,913	516,628
Refinery consumption ...	187,516	209,919
	863,412	976,056
Lubricating oils and greases ...	53,556	54,351
Paraffin wax and scale	2,888	2,290
Petroleum gases	8,337	9,541
Bitumen	113,785	134,908
Other products	181,037	183,942
	2,018,834	2,237,817

PETROLEUM IN PARLIAMENT

Coal Industry Bill

On 23 November a debate was held on the Second Reading of the Coal Industry Bill in which the following points were made pertaining to the petroleum industry.

Frederick Lee (Newton) remarked that "the Government's free-for-all policy" on fuel and power supplies failed to take into account "the fact that fuel oil is sold at below the price of crude oil because it is merely a by-product of petrol. Between 1953–58 fuel oil consumption increased by 11½ million tons of coal equivalent, or by 1⅞ times what it had been." U.K. oil production had increased by 22 per cent, and imports rose by 66 per cent. The Government, unlike those of some European countries, had refused to protect their coal industries from this sort of thing.

Mr Lee said that "although up to three years ago oil was supplementing coal, since then it has been replacing it". It was said that between 1948 and 1956 oil consumption had increased by 100 per cent while that of coal rose by only 12 per cent. In 1948, out of a total energy requirement of 212 million tons, coal supplied 91 per cent and oil 9 per cent. In 1956 coal supplied 85 per cent and oil 15 per cent of the total of 254 million tons. Although during that period coal's percentage contribution had decreased the total amount of coal consumed had risen from 192 million to 215 million tons.

Then, it was said, the situation changed, and between 1956–58 the total energy requirement fell. Coal consumption was down by 20 million tons over that period, and in the first half of 1959 it had again decreased by a further 10 million tons as compared with the first six months of 1958. Meanwhile oil consumption had been rising steadily. At the end of 1958 the total energy requirement was 248 million tons—a coal equivalent consumption of 199 million tons, or 80 per cent, and an oil consumption of 47 million tons, or 20 per cent.

Mr Lee asked what was the size of the oil stocks in Britain, and how much did this stockpiling cost the taxpayers "in contradistinction to the fact that it does not cost the taxpayers a single penny to stockpile the coal about which we have heard so much."

William Stones (Consett) said that his Party asked for the restriction on the importation of liquid methane. "The millions of pounds that have been spent on methane-carrying ships and shore installations would have been better spent on financial inducements to fuel users to install the newer coal-burning appliances."

Woodrow Wyatt (Bosworth), after pointing out that he now represented a constituency in which there are between 8,000–10,000 miners, asserted that the Government was blinded by a smattering of science which they did not understand and by the propaganda of the oil companies. He said that it might be 30 years before atomic energy could be relied upon to provide any substantial load of power. Meanwhile oil was running out fast. This was something which, it was said, the oil companies did not tell potential customers when they bought oil-burning appliances.

"The consumption of oil in the world is going up by 7 per cent a year. In ten years, we shall be using double the amount of oil we use to-day. In twenty years, the world will be using four times the amount of oil it uses to-day. That may be an underestimate of the increased rate of consumption of oil year by year. At the moment, in South-East Asia, people are using 5 gallons of oil per head of the population per year. In Britain, on the other hand, we use 122 gallons of oil per head per year, and in America the figure is 600 gallons. It is very unlikely that this tremendous disparity between ourselves and the underdeveloped countries in the use of oil will continue much longer. In twenty years, there will almost certainly be a major oil crisis in the world.

"The proved reserves to-day are only 40,000 million tons; and even the wildest estimates of future discoveries do not put the total amount of oil in the world at more than 200,000 million tons. A good deal of that is in areas which it is extremely difficult to drill and exploit.

"In twenty years' time, the oil companies will be down to about the last thirty years of their supply at the rate of consumption which will then have been reached in the world as a whole. If that rate of consumption increases beyond the next twenty years, it will be much less than thirty years' supply that they will have left. Several consequences will flow from that. The oil companies may reduce their exploitations of new fields because they will not be able to see the necessary return for their capital outlay in exploiting those new fields, and they will certainly have to charge a great deal more for the oil that they will then be producing. All those people who have fallen for the oil companies' propaganda and have installed oil burning equipment will be in serious difficulties.

"Of the big three countries—Russia, America, and Britain—we are the most vulnerable, because America and Russia have the largest internal deposits of oil and our supplies come mainly from the Middle East. Even in America, the situation is not very healthy, because the Americans regard themselves increasingly as major importers of oil. Even if the Government have not dislocated our oil supplies by another Suez adventure, the Middle East oil companies will be reluctant to go on supplying us with unlimited quantities of oil, because they and the other under-developed countries will want to use some of it themselves."

Mr Wyatt went on to ask whether oil was likely to continue to be cheap. The price structure of fuel oil was said to be completely artificial. It depended "entirely on a balance between the amount of petrol consumed in motor transport and the amount of the residual product which is then sold as fuel oil . . ." The motorist was thus said to be subsidizing the destruction of our coal industry.

If this were not so, the Member asked, "why should there be a vast surplus of fuel oil left in Germany following on the fact that a tax has been imposed on fuel oil and the rate of petrol production is now far too high to maintain the correct ratio between the producers of petrol and fuel oil?"

It required only a small change in this ratio, it was said, for the price of petrol or of fuel oil to have to go up. The very success of the oil companies in persuading more and more factories and people to install oil-burning equipment would eventually put up the price of fuel oil unless the number of motorists increased at the same pace, which was said to be extremely unlikely.

On the subject of fuel for power stations Mr Wyatt said that the latter should not be allowed to go over to oil when it was neither cheaper nor more efficient than burning coal. He remarked that oil corroded the furnaces in a way which coal did not. One should not pass a Clean Air Act giving automatic exemption to oil installations, but requiring manufac-

turers of coal-burning appliances to be dependent on the whims of local authority inspectors.

It was pointed out by Mr Nabarro that British investment in oil in 1946–59 was £2050 million as an aggregation of investment in refineries in Britain, in British refineries abroad, in British tankers, and in the equipment for refineries and pipelines. In 1958 the value of petroleum products exports from Britain was £104 million—5¼ times as much as the value of coal exports.

Harold Finch (Bedwellty) told the House that he had been advised that imported fuel oil is sold at about £6 10*s* a ton, and crude oil at £8 10*s* a ton, while petrol is sold at £16 10*s* a ton. It was allowing the oil companies to make good their losses on fuel oil. He said that as 40 per cent of the refined oil that Britain produces comes from fuel oil, whilst for petrol the figure is only 25 per cent, how could fuel oil be regarded as a residual product.

In his reply to the debate, J. C. George, The Parliamentary Secretary to the Ministry of Power, gave the names of the power stations which have been converted for using coal. They were as follows—and countermand some of the decisions reported at Inst. Petrol. Rev., 1959, Vol 13, page 48.

Northfleet and West Thurrock, which were designed to burn oil will now burn coal; conversion of Portishead B from coal to oil will not take place; and the conversions to oil of Littlebrook B and Brunswick Wharf have been postponed.

Mr George emphasized the world-wide aspect of oil prices and told the House that, for the first six months of 1959, Customs declared fuel oil was £6 19*s* at the Port of London, while crude oil was £8 2*s*. Fuel oil, it was said, however, had to be sold and transported and the average selling price in London in the last six months had been £10 15*s* wholesale for imported fuel oil. It was not sold at prices less than those of crude oil although it had always been the case that fuel oil was imported at a cheaper price than crude oil—which is refined and thereby yielded a much higher price.

Oil and Coal

The Minister of Power was asked on 23 November whether, in view of the plight of the coal industry, he would consult with the President of the Board of Trade with a view to limiting the import of fuel oil.

The Minister turned down the suggestion saying that more fuel oil was already produced in the U.K. than was consumed there. Therefore it was not an import which was destroying the coal industry.

G. Nabarro (Kidderminster) pointed out to the Minister that the value of coal exports in 1958 was £20 million, whereas the value of petroleum products exports amounted to £104 million.

In answer to a question on 23 November as to what extent the estimated fall of 13 million tons in coal consumption in 1959 compared with 1958 was due to a decline in exports displacement of coal by oil, etc, the Parliamentary Secretary to the Ministry of Power said that exports and bunkers were likely to be down by 750,000 tons, and increased use of oil might account for about 7 million tons.

Expenditure on Oil Stocks

The Minister of Power said, in answer to a question on 30 November, that capital expenditure by the Ministry of Power on the supply, storage, and distribution of petroleum products was £7·7 million in 1958–9 and was expected to be about the same in the current financial year.

Power Stations

The coal equivalent of the oil burining at Central Electricity Generating Board power stations in 1958 was said by the Parliamentary Secretary to the Ministry of Power, in an oral answer on 30 November, to be approximately 4 million tons. The estimate for 1959 was 7 million tons.

Oil Heaters (Safety Devices)

The Minister of State to the Board of Trade said in a written answer on 8 December that the DSIR was working as a matter of urgency on the problem of the flaring of oil heaters in draughts, and that the BSI was reviewing the standard for domestic stoves.

Motor Vehicles (Exhaust Fumes)

In a written answer to a query on 10 December as to what progress had been made by the DSIR in connexion with the muffler device of a filtration character brought from the U.S.A. for experimental purposes regarding the abatement of noxious fumes from motor vehicles, the Minister of Education, representing the Minister for Science, said that the device was not in commercial production. It had not yet reached the stage of development when the DSIR could assess the claims of the manufacturer. The Warren Spring Laboratory was, however, keeping in touch with this development and two other recent devices, from the U.K. and Switzerland, are to be tested.

Carriage of Dangerous Liquids and Gases

The Home Secretary said in a written answer on 3 December that the chemical and road transport industries were willingly co-operating in preparing a scheme for the marking of vehicles carrying dangerous substances. A detailed code of marking was now being drawn up.

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U.K. OIL EQUIPMENT EXPORTS

During the year 1959 the following quantities of petroleum equipment were exported from the United Kingdom. Comparative figures for 1958 are also given.

	1959		1958	
	Quantity cwt	*Value* £	*Quantity* cwt	*Value* £
Oil fuel burning equipment	22,795	922,620	28,413	1,003,206
Oil well drilling machinery	150,380	4,681,786	105,301	3,559,547
Mineral oil refining machinery	54,612	1,436,947	60,220	1,627,516

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U.K. TEL EXPORTS

Exports of tetraethyl lead from the U.K. in 1959 totalled 6,210,515 gallons, an increase of 940,864 gallons or 17·9 per cent compared to the 1958 figure of 5,269,651 gallons. The correspondirtg value was £1,267,216 higher at £12,682,689.

Books and Films

"BP News in Pictures 1959"

A selection of photographs showing some of the immensely varied activities of the British Petroleum Group during its half-century year have been published in *BP News in Pictures* 1959. Each section of the Group's operations is featured—exploration and production in the Middle and Far East; the world-wide refineries; and the launching of the big new tankers and the construction of the giant terminals to accommodate them. In addition glimpses are seen of various types of marketing procedures in different countries, and of the achievement of BP fuels and lubricants in the field of motor sport and world records.

National Benzole and Modern Motoring

In 1919, to own a car at all was exceptional and it would probably have been an open one, because saloons were more expensive in those days. The official speed limit was 20 mph. There were no windscreen wipers, so that driving in rain was both hazardous and uncomfortable. Dry weather presented snags, too, since most roads were unmade and a motor car's passage along the highway would be marked by a large dust cloud.

Getting fuel was also a haphazard business. There were no roadside pumps and the motorist bought his fuel in two-gallon cans from garage workshops, cycle agents, household ironmongers, village blacksmiths, and even from inns and chemists. The price was 2*s* 6½*d* a gallon, compared with an average of 2*s* 3*d* a gallon to-day, excluding tax, for a much higher quality product.

The story of motoring since 1919, and of the impact it has made in Britain, is told in *Forty Years of Motoring* by Edward Young. It is basically the story of the National Benzole Company, which from small beginnings in 1919, in a single office room in Horseferry Road, Westminster, has grown into one of the largest motor-fuel marketing companies in Britain. In addition, and stemming from this, the book is also a comprehensive survey of all aspects of motoring history since that date. It tells of the development of the modern mass-produced car and of the coach-built luxury models; it covers the motor-racing scene from Brooklands to Silverstone, and tells the story of the various attempts on the world land speed record.

Well-written, and containing a profusion of historical photographs, the book should greatly interest anyone having the slightest interest in motoring. The book is illustrated with 150 photographs, and is published by Stanley Paul, at a price of 25*s*.

Alan Robertson (third from left), *managing director of National Benzole, and Edward Young* (second from left) *chat with the two longest-serving members of the Company's staff, F. R. Edwards* (left) *assistant manager, Advertising Department, and B. E. Bolton* (right) *of the Finance Department, at a publication day party*

Translation of Russian Journals

Coking Technology

As part of the scheme inaugurated and supported by the DSIR by which cover-to-cover translations of Russian technical journals are made available, an English version of "*Koks i Khimiya*", under the title *Coke and Chemistry, USSR*, is being produced by the Coal Tar Research Association in conjunction with the British Coke Research Association.

Of especial value will be the information given on current advances in Russian coking technology. The first issue to be prepared was that for August 1959 and specimen copies are now available on request from the Coal Tar Research Association. A subscription leaflet will be ready shortly and all correspondence should be sent to the Information Officer, The British Coke Research Association, Coke Research Centre, Chesterfield, Derbyshire.

Chemical Journals

The DSIR is also assisting the Chemical Society in publishing cover-to-cover translations of two additional Russian chemical journals. The *Russian Journal of Physical Chemistry* (*Zhurnal Fizicheskoi Khimi*) is to be published by the Society in translation starting with the issue for July 1959, which was made available in January 1960. Subsequent monthly issues will appear regularly and it is hoped that the interval between the receipt of the Russian original and the publication of the translation will eventually be reduced to about three months. R. P. Bell, F.R.S., is scientific editor of the translation.

The journal *Uspekhi Khimii* will be published monthly in translation under the title *Russian Chemical Reviews*, starting with the issue for January 1960, which it is hoped to make available in April 1960. The scientific editor of the translation will be Dr J. N. Agar, assisted by Dr A. R. Katritzky and Dr R. H. Prince.

Subscription rates are as follows:—

Russian Journal of Physical Chemistry, £30 per annum, including postage;

Russian Chemical Review, £12 per annum, including postage.

A discount of 25 per cent on the above subscription rates is granted to the libraries of Universities and Technical Colleges.

All subscription enquiries should be addressed to the sole distributors, Cleaver-Hume Press Ltd., 31 Wright's Lane, London, W.8.

"Oil in Australia"

A four-page brochure on *Oil in Australia* has been prepared and issued by Dempsey-Tegeler & Co., members of the New York Stock Exchange, from their offices at 723 Houston Club Building, Houston 2, Texas. It is intended as a concise summary of the large quantity of bulletins, reports, and opinions on the subject of Australian oil that have reached print in the last 30 years. It gives a brief review of the country's oil market and of its history of oil search. In addition, two good maps feature respectively the sedimentary basins of Australia and the principal oil exploration concessions held at September 1959.

British Standard for Kerosine Heaters

Manufacturers of oil heaters and representatives of the major oil companies together with research, safety, and consumer interests who met at British Standards House in London recently, agreed that, while the present British Standard (BS 2049) for kerosine heaters is satisfactory in almost every respect, scientific information may be soon available that will make it possible to strengthen the standard still further from the safety consideration.

The most important change now contemplated is the inclusion in the standard of a new draught test to protect against sudden flaring. The DSIR are putting substantial resources to testing and analysing the effects of draughts on domestic heaters. The facts will be made available to the BSI as soon as they are known and this work is being done as a matter of special urgency.

Finalization of this essential scientific work will not be long delayed, but until the resultant information becomes available, any attempt to revise standards, and any statements about safety, are bound to be premature.

The meeting agreed that it was important to remember that accidents from oil heaters are proportionately rare. Oil heaters were on the whole reliable and trustworthy but it was important that manufacturers' instructions as to use should be followed.

Reputable manufacturers produce heaters in accordance with British Standard 2049 and shoppers should ask for an assurance that appliances have been so constructed. The standard will be kept up to date in accordance with the best knowledge available and it is expected that a greater proportion of manufacturers will, in future, submit their products for independent testing under the BSI Kite-mark scheme, so that intending purchasers will have a ready and reliable assurance that heaters offered to them for sale agree with the British Standard requirements.

LPG in Industry

Produced for Shell-Mex and B.P. Gases Ltd, the film *Liquefied Petroleum Gases in Industry* illustrates in about 25 minutes some of the wide variety of uses to which LPG can be put. Among the utilization plants which are visited in the film are those of the Ford Motor Co., the Bifurcated and Tubular Rivet Co., the General Electric Co., the Whitefriars glass works, the Pirelli General Cable Co., the Borg-Warner Co., and the E.N.V. Engineering Co. In each case reasons are given and illustrated as to why these gases are superior to other forms of fuel. The film also provides an interesting insight into some of the operations employed in manufacture of the materials concerned.

Glass tube coming off sleeve with Propagas flame

Produced by Random Film Productions Ltd, producer was David Blair, and the production was supervised by Ronald F. Leach and Harry Hossent. Copies in 35 mm or 16 mm will be available on free loan after 1 September from Shell-Mex and B.P. Ltd, Public Relations Department, Shell-Mex House, Strand, London, W.C.2.

Electricity Generation and Distribution

An excellent and instructive film, which is the first of a series of "Industrial Notebooks", has been prepared by Shell-Mex and B.P. Ltd with the subsidiary title of *The Generation and Distribution of Electricity*. With a running time of 25 minutes it highlights the very considerable developments in this field in recent years. In contrast it first describes the tiny water-driven alternator at Downton, Wiltshire, and then switches to the huge Loch Sloy hydroelectric scheme.

A heat exchanger comes ashore at Bradwell

A visit to the new station being built at Northfleet, Kent, illustrates some of the problems involved in the installation of a large transformer. Particularly interesting is the care taken to ensure, by the use of special filtration and degassing equipment, that the transformer oil is free of contamination. These transformers had to be filled on site because of their size and weight.

Another problem of transportation was the transfer of huge heat exchangers to their location at the Bradwell-on-Sea, Essex, nuclear power station. The illustrations of transfer from ship on to submerged trailer, and from trailer to final location, are portents of the shape of things to come.

Other illustrations of the problems of the electricity industry included the use of a Bristol Proteus jet engine as a prime mover coupled to a generator, the production of aluminium cable, and the breakdown testing of insulators.

Directed by Peter Mills, the film was produced for Shell-Mex and B.P. Ltd by Random Films Ltd. Producer was David Blair. It will be available in 35 and 16 mm gauges on free loan next season from the Shell-Mex and B.P. Film Library, Shell-Mex House, Strand, London, W.C.2.

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MIDDLE EAST OIL PRODUCTION

	December	*Jan.–Dec.*
	Tons	
Iraq Petroleum Co. Ltd ...	2,575,188	27,330,109
Basrah Petroleum Co. Ltd ...	987,567	12,297,162
Mosul Petroleum Co. Ltd ...	109,333	1,270,405
Qatar Petroleum Co. Ltd ...	605,116	7,866,650
Iraanse Aardolie Exploratie en Productie Mij	3,831,000	44,677,000
Kuwait Oil Co. Ltd ...	5,455,596	68,437,498
	Barrels	
Arabian American Oil Co. ...	37,498,894	399,820,590
Bahrain Petroleum Co. Ltd ...	1,395,083	16,473,378
Getty Oil Co. (Kuwait–Saudi Arabia Neutral Zone) ...	3,880,702	42,438,490

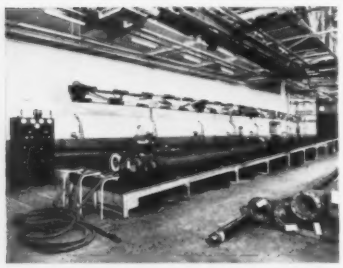
The refinery throughput at Abadan of the Iraanse Aardolie Raffinage Mij for December was 1,330,000 tons, the total for 1 January to 31 December being 15,442,000 tons.

Revenue accruing to the Iranian Government from Consortium oil operations in 1959 reached approximately £92·25 million.

Crude processed at Aramco's Ras Tanura refinery during December was 5,406,229 brl, the total for 1 January to 31 December being 63,609,799 brl.

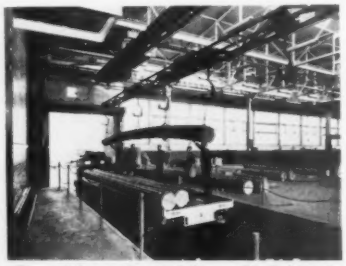
Trade Literature, etc.

Oil Hose Manufacture In Scotland



The oil hose test area with hose being mounted on the test tank ready for pressure and vacuum testing

The main feature of The North British Rubber Company's £3 million modernization programme just completed is the new hose plant at Castle Mills, Edinburgh factory, where the Company was founded 103 years ago. The Company is now affiliated to the United States Rubber Company and the new plant is reckoned to be the most modern of its kind in Europe. Hose has always been one of North British's main products and the layout of the plant permits a straight-line flow from materials storage to despatch of finished goods. Ninety per cent of the Company's oil hose is for export and special attention has been paid to hydraulic testing equipment for all heavy hose. This is important for oil loading and rotary drill hose. A recent innovation is the making of a special 3½-mile length of collapsible hose for the Ministry of Supply for fuelling purposes from a portable tank.



The oil hose dispatch bay. 30 ft lengths are being loaded for shipment abroad

In addition to a wide range of hose for the petroleum industry and for hose resistant to oils and chemicals, North British offers a fully comprehensive range of hose for almost every conceivable purpose. Coincident with expansion in the hose plant there has also been a doubling of capacity in the Tyre Division and further expansion is planned for 1960 and onwards.

Case History of the Port Moody Refinery

A case history of the contractual, engineering, and construction decisions made by British American Oil Company Ltd and Canadian Kellogg Company Ltd, resulting in the building of the former's new Port Moody refinery in record time and at low cost is presented in a new *Kelloggram* just published by Kellogg. The brochure traces the month-by-month development of the 20,000 bsd project in diary, photo, and chart form.

The type of contract is discussed in relation to plant costs, a simplified flowsheet shows how the refinery was designed to meet BA's marketing needs, and details and photographs are given of the engineering design features and of Port Moody's six main processing units.

Teamwork: Key to Investment Efficiency, the new *Kelloggram*, may be obtained from The M. W. Kellogg Company, 711 Third Avenue, New York, NY, or The Canadian Kellogg Company Ltd, 33 Bloor Street East, Toronto 5, Canada.

New Antioxidant for Oils and Lubricants

A new general purpose, ashless antioxidant, based on a mixture of aryl amines is now available from the Du Pont Company for use in greases, turbine and crankcase oils, and ester lubricants.

To be marketed as *Ortholeum* 302 antioxidant, the compound when used as a stabilizer in synthetic lubricants effectively inhibits viscosity change, copper corrosion, and acid number increase in high temperature oxidation tests. In automobile engine and laboratory bench tests the new product reduces bearing corrosion, oxidation, and acid formation in mineral and synthetic oils as well as greases. It is said to be generally effective at low concentrations.

Rocol Molycue Greases

The series of "Molycue" Greases manufactured by Rocol Ltd, Rocol House, Swillington, near Leeds, have, it is claimed, proved themselves to be exceptionally reliant and efficient under operating conditions fatal to other lubricants.

The greases are a combination of molybdenum disulphide with polyalkylene glycols, with or without the addition of thickeners. Rocol have produced several combinations of molybdenum disulphide and polyalk lene glycols. These include *Molycue* and *Molycue* 10 for use in glass and ceramic working and fabricating machinery, for kiln car axle lubrication, and in ovens and driers; and Molycue Greases U.10 and W.10, for general application under normal conditions where rubber or solvents are encountered, and having a 320 penetration, may be applied by means of grease guns and ordinary nipples or cups.

Castrol Lubrication Chart

Castrol have just published a lubrication chart for the Ford New Anglia and Prefect models.

Copies are available free on request to The Castrol Chart Library, Castrol House, Marylebone Road, London, N.W.1.

Pipeline Equipment Agreement

H. & E. Lintott Ltd, of Horsham, has signed an agreement with William L. Riggs Company, of Tulsa, Oklahoma, to sell and ultimately manufacture the "Safety Boy Flange Spreader", a tool for parting flanges on pipeline installations. The tool is particularly suitable for high-pressure steam lines and corrosive chemical lines of any size.

New Portable Mixer

The Pioneer Mixer, just introduced by Premier Colloid Mills Ltd, Hersham Trading Estate, Walton-on-Thames, Surrey, gives manufacturers in almost every major industry the advantage of a completely portable unit capable of mixing batches from 25 gallons to as large as 1000 gallons. The mixer can be supplied on a mobile stand, or is suitable for clamp mounting.

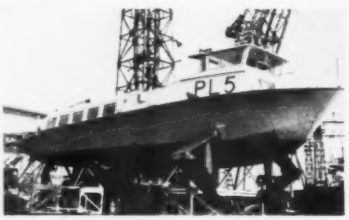
Booklets on New Plastic Film

The series of booklets, recently published by British Cellophane Ltd, give first details about the properties and uses of five new plastic films now supplied by the company.

The booklets: *BCL Nylon Film*, *BCL Polypropylene Film*, *BCL Plasticized PVC Film*, *BCL PVA Film*, and *Styrafoil Polystyrene Film*, are available free of charge on application to British Cellophane Ltd, Henrietta House, 9 Henrietta Place, London, W.1.

"Hydrofoil" Launch for Offshore Operations

In order to speed up the conveyance of oilfield workers from the shore to drilling sites in Lake Maracaibo, Venezuela, a "hydrofoil" craft, capable of carrying fifty passengers, has been built for Cia Shell de Venezuela at the Gusto shipyard, Schiedam, Holland.



The hydrofoil craft PL 5 at Schiedam

Drilling personnel at work on the underwater concessions in the lake sometimes have to travel up to 35 miles by water to drilling locations.

The launch's top speed of 35 knots is obtained by the action of "hydrofoils" or stream-lined planes attached to the hull, which exert lifting power when the craft is travelling at speed. The hull is lifted as the speed increases until the whole hull is clear of the water. Resistance is greatly reduced and the braking action of waves almost entirely eliminated.

The launch is 70 ft in length, and is powered by a Mercedes-Benz diesel engine with a maximum output of 1350 bhp. In service conditions in Venezuela the engine will be run at about 1000 bhp at 1500 rev/min in order to allow a longer period between overhauls. Three other launches of the same type are being built by Gusto N.V. for operation in Venezuela.

Hunting Survey Group Changes of Name

In order to simplify and streamline the structure of certain British and Canadian companies in the Hunting Survey Group, the following changes have been announced. In Britain the activities of Hunting Geophysics Ltd have been merged with those of Hunting Aerosurveys Ltd, and the name of the new combined company will be Hunting Surveys Ltd.

The two other companies in the British division of the Hunting Survey Group, Hunting Technical Services Ltd, and Aerofilms Ltd, will continue to work in close association with Hunting Surveys Ltd.

In Canada, the activities of The Photographic Survey Corporation Ltd, Hunting Airborne Geophysics Ltd, and Hunting Technical & Exploration Services Ltd, have been combined under the name of Hunting Survey Corporation Ltd.

De Havilland Electro-Mechanical Equipment

Three recent leaflets published by De Havilland Propellers Ltd, Hatfield, Hertfordshire, are of particular interest to the petroleum industry and cover the following subjects: function, performance, and characteristics of the Company's electro-mechanical torque motors; their portable automatic multi-core cable tester; and their transistor curve tracer.

Each pamphlet is concisely set out with the aid of photographs and charts.

Safety Periscope

A new piece of optical equipment called a "Safety Periscope" has been added to the range of remote and indirect viewing equipment made by P. W. Allen & Co., 253 Liverpool Road, London, N.1.

This periscope, the Allen Type A.201, is for the use of observers when closely viewing equipment and processes through sight glasses in pressure vessels, furnaces, chemical plants, etc., who are in great danger of serious injury in the event of window breakage.

Fire Hydrant Valve

Merryweather & Sons Ltd, Greenwich High Road, London, S.E.10, has issued a leaflet giving details of its Parity fire hydrant valve for use on high pressure mains, up to 350 psi. It reduces the pressure to a pre-determined figure and is designed to feed a $\frac{3}{4}$ inch diameter nozzle at a pressure of 65-75 psi.

Hot Plate for Standard Tests

An electric heater unit made by Isopad Ltd, Barnet By-Pass, Boreham Wood, Herts, type ISP/30 - 5 inches, 900 w at 230 v is in use at the test laboratories of BP Refinery (Llandarcy) Ltd.

It provides a neat and convenient heating surface for the Erlenmeyer flasks and condenser assemblies used for standard tests of oils, fats, and waxes, and saponification value to IP 136.

Brown Boveri betatron installation

Non-Destructive Testing

The 31 MeV betatron instrument is made by Brown Boveri & Sons (Electro-Medical) Ltd, Industrial Division, East Lane, North Wembley, Middlesex. It is suitable for the non-destructive testing of very thick materials and for research with high energy X-rays and electrons. The radiation energy is adjustable up to 31 MeV, and in some models up to 35 MeV.

The apparatus is also used for nuclear physics studies, including photo-nuclear reactions and generation of Cerenkov radiation. It has also been used to study biological processes induced by high energy X-rays and electrons as occur, for example, in therapy and genetic changes.

Milford Haven Tug for the 100,000-tonners

The development of an ocean oil terminal at Milford Haven calls for a fleet of tugs capable of handling at first tankers up to 65,000 tons dw, and later others of 100,000 tons dw.

To this end, Richard Duston Ltd, of Thorne and Hessle-on-Humber, in conjunction with the owners, R. and J. H. Rea Ltd (subsidiary company of William Cory & Son Ltd), have produced a powerful tug with a bollard pull of at least 20 tons. The first of these, the motor tug *Stackgarth*, recently left the builders and three more are due to follow. It is larger and more powerful than the conventional tug, is designed for pushing, and can be used for fire-fighting operations.

The main propulsion unit is a British Polar K47M engine, developing 1300 bhp at 300 rev/min, driving through an M.W.D., size 9,2:1 reduction gearbox to give a propeller speed under normal conditions of 150 rev/min.

The choice of a Kort nozzle for propulsion enables a smaller engine to be used, and gives greater manoeuvrability than would an open, or in certain cases, a twin-screw installation. It provides about one third more power and pull and is claimed to operate as efficiently while going astern as forward.

Fire-fighting potential is 3000 gal of water/min at 100 psi, or 12,000 gal of foam/min, and water and foam monitors are placed on the top of the super-structure. In addition, the tug has been equipped for ocean-going and salvage operations.

ICI Plastics Developments

Rapid progress was made during 1959 on the erection of ICI's polypropylene (*Propathene*) plant at Wilton, Yorkshire. Reports from the chemical engineers engaged on the job indicate that this 10,000-ton-capacity plant will be on stream towards the end of this year; earlier, it was expected that the plant would not be ready before 1961. The site is now fully developed, roads have been made, and buildings completed ready for the processing equipment to be installed. It is believed that the *Propathene* plant will be the first commercial scale polypropylene plant to come into operation in Britain.

Alongside the plant, which is being built in a way that will allow for rapid expansion, the Plastics Division will produce organo-aluminium compounds in bulk for use as catalysts in the process.

Propathene is particularly suitable for moulding uses, as it is said to have greater rigidity and temperature resistance than other polyolefines. It is also expected to find extensive use in film form and as a general extrusion material, and is now available in the form of coloured compounds as well as natural polymer.

ICI Plastics Division also announces that it is to increase polythene production by approximately 15 per cent in 1960, bringing the annual output to about 105,000 tons. Fears that there may be a shortage of polythene in the domestic market this year are therefore allayed. The supply position will be further improved by re-deployment of ICI's total sales. As a result of the completion of new Company plants in India and Australia, and increased production in France and Germany, more ploythene will be available for home distribution.

Safety Belt Demonstrations

As part of a programme to demonstrate the effectiveness of the new lightweight safety belts and harness made by Barrow Hepburn & Gale Ltd, P.O. Box No. 413, Grange Mills, Bermondsey, London, S.E.1, a series of tests and demonstrations were recently carried out on the Tower Block of the new Shell building now being erected on the South Bank site.

Unlubricated Plug Valve

All the advantages of the use of plug valves in chemical and process engineering are said to be applicable to the Langalloy-Durco type "F" plug valve, manufactured by Langley Alloys Ltd, Langley, Slough, Bucks. In addition the use of lubricants, which has certain disadvantages, has been eliminated by the use of a sleeve of PTFE between the body and the plug.

ICI Acrylonitrile Plant On Stream

At the beginning of last December trials of the ICI General Chemicals Division's acrylonitrile plant at Cassel works, Billingham, were successfully completed. This is an important development for British manufacturers of synthetic rubber copolymers and acrylic textile fibres, who have hitherto been dependent on imported raw materials. The plant has adequate capacity to meet all foreseeable home demands.

The major outlet will be for acrylic fibres but there is an expanding demand for the manufacture of high impact strength resins. ICI will itself use some of the output for its *Butakon* range of butadiene acrylonitrile synthetic rubbers.

Investment in French Company

Elliott-Automation announces that negotiations are proceeding with Manufacture de Machines Du Haut-Rhine SA ("Manurhin"), of Mulhouse, with a view to arrangements being made for the manufacture in France of automation equipment.

It is proposed that Elliott-Automation will take a financial interest in Manurhin.

Dow Forms German Subsidiary

The formation of a new company, Deutsche Dow Chemie GmbH, at Dusseldorf, Germany, has been announced by Dow Chemical International Ltd SA. The wholly-owned German subsidiary will provide German operators of oil and gas wells with acidizing, fracturing, and cementing services.

Extension of Head Wrightson's Operations

The activities of Head Wrightson Processes Ltd, a subsidiary of Head Wrightson & Co. Ltd, have been extended to cover all Head Wrightson's nuclear research and nuclear power interests.

With headquarters at Yarm-on-Tees, in Yorkshire, Head Wrightson Processes will be responsible for carrying out the work at Bradwell and Latina nuclear power stations, in addition to the research reactor projects in Denmark and Germany. With a London office at 20-24 Old Street, E.C.1, the Company will continue to design and manufacture industrial cooling equipment, water treatment plant, and specialized chemical plants.

G. P. Davidson has been appointed managing director of Head Wrightson Processes Ltd, and the board has retained the services of Dr R. C. Fisher, who will act as advisor on nuclear research reactors and other nuclear projects.

Nickel Alloys Exhibition

Henry Wiggin & Co. Ltd is staging an exhibition on "Wiggin Nickel Alloys in Industry" at Park Lane House, 45 Park Lane, London, W.1, on 21-25 March, 1960.

During the exhibition a series of lectures will be given on various subjects including the fabrication of high-nickel alloys and on the uses of high-nickel and nickel-base alloys in the nuclear, electrical, and chemical industries.

SITUATION WANTED

British Petroleum Engineer, at present in U.K., with over 20 years' experience of oilfield Drilling, Producing, Pipelining and Processing techniques, wishes to retire from the East before the end of the year and work in U.K. or possibly Europe. Will interested companies please write Box No. 1130 *IP Review* before the end of March.

SITUATION VACANT

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American Oil Company operating in the Middle East require a Refinery Process Engineer to take charge of their small refinery in the Middle East. Candidates, preferably holding a University degree, should have considerable experience in refinery processing and technical problems. Family housing will be provided for a married man, above average salary plus living allowance. A pension scheme is pending and liberal home leave is granted. This is a highly remunerative position for a well-qualified man. Box No. 1129 *IP Review*.

Forthcoming Meetings

THE INSTITUTE

(*At* 61 *New Cavendish Street, London, W.*1, 5.30 *p.m.—tea* 5 *p.m.*)

Some Aspects of Filter Clogging Propensities of Middle Distillates. J. R. Lodwick, B.Sc., A.R.I.C., and R. Greatorex. **6 April**

IP ESSEX BRANCH

(*At Railway Hotel, Pitsea*, 7.30 *p.m.*)

Talk by K. D. Eke of International Computors and Tabulators. **16 March**

IP FAWLEY BRANCH

(*At Esso* (*Fawley*) *Recreation Club, Holbury*, 7.30 *p.m.*)

Man-Made Fibres. A. S. Carpenter, B.Sc., Ph.D., A.R.I.C. **9 March**

(*At Esso Refinery, Fawley*)

Disposal of Industrial Wastes. Full day Joint Symposium with RIC **2 April**

IP LONDON BRANCH

Luncheon Meeting **16 March**

(*At* 61 *New Cavendish Street, London, W.*1, 6 *p.m.—tea* 5.30 *p.m.*)

Technical Education in Russia. Prof. H. Levy, M.A., D.Sc., F.R.S.E. **22 March**

IP NORTHERN BRANCH

(*At Engineers' Club, Albert Square, Manchester* 2, 6.30 *p.m.*)

Lubrication of Gears in Service. E. R. Pell **15 March**

IP SCOTTISH BRANCH

(*At BP Refinery Recreation Hall, Grangemouth*, 7.30 *p.m.*)

Colour. Joint Meeting with RIC and SCI **17 March**

IP SOUTH-EASTERN BRANCH

(*At King's Head Hotel, Rochester*, 7.45 *p.m.*)

The Petroleum Industry's Role in the World Car Market Development. K. E. W. Ridler, Ph.D. **5 April**

IP SOUTH WALES BRANCH

(*At the Training Centre, BP Refinery* (*Llandarcy*) *Ltd*, 5.30 *p.m.*)

Chemistry in the Service of Medicine. Prof. C. H. Hassall, Ph.D., F.R.I.C. **10 March**

IP STANLOW BRANCH

(*At Blossoms Hotel, Chester*, 7.30 *p.m.*)

Symposium—People and Oil. E. S. M. Chadwick, F.C.C.S., M.I.P.M., J. A. G. Croxson, K. E. Shurey **16 March**

IP YORKSHIRE BRANCH

(*At the University of Leeds*, 2.30 *p.m.*)

Symposium on Fuel Oils. **30 March**

IP ECONOMICS AND OPERATIONS GROUP

(*At* 61 *New Cavendish Street, London, W.*1, 5.30 *p.m.—tea* 5 *p.m.*)

The Future of the Electricity Industry. L. O'Donnell. **10 March**

THE SOCIETY OF INSTRUMENT TECHNOLOGY

(*At the Manchester Room, Central Library, St. Peter's Square, Manchester* 1, 6.45 *p.m.*)

Some Instrument Developments in the Oil Industry. G. C. Eltenton, B.A., F.Inst.P. **8 March**

OIL AND COLOUR CHEMISTS' ASSOCIATION

(*At Royal Society of Tropical Medicine and Hygiene*, 26 *Portland Place, London, W.*1., 7 *p.m.*)

Painting in the Petroleum Industry. H. B. Footner, B.Sc., Ph.D., A.R.I.C. **30 March**

ROYAL INSTITUTION OF NAVAL ARCHITECTS

(*At* 10 *Upper Belgrave Street, London, S.W.*1, 10.15 *a.m.*)

Methane Transportation by Sea. E. C. B. Corlett, M.A., Ph.D., J. F. Leathard, B.Sc., Ph.D. **24 March**

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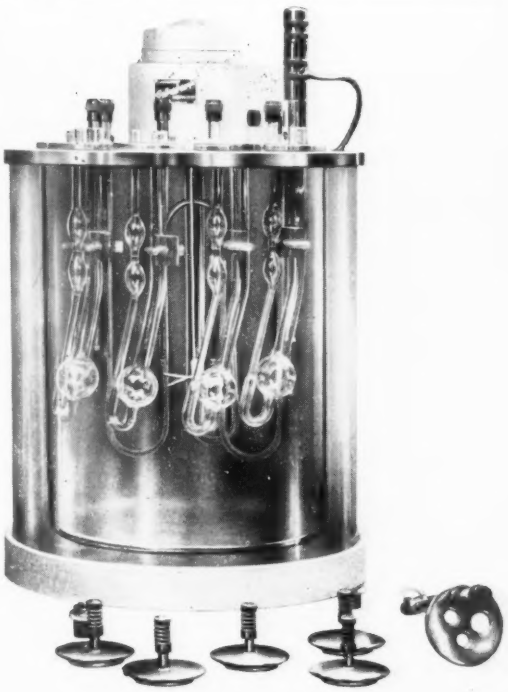

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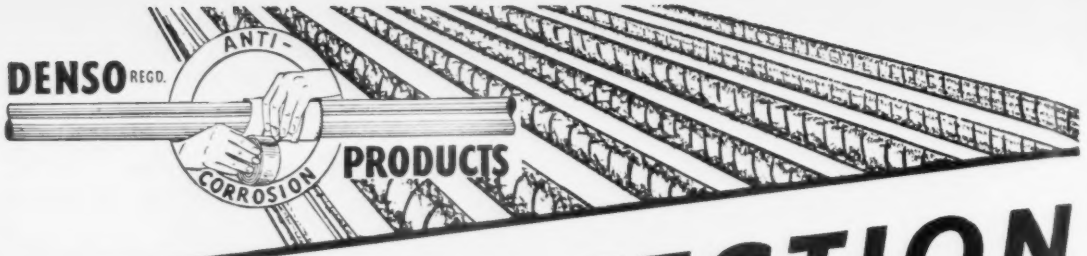

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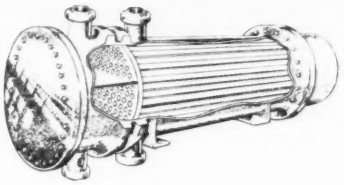

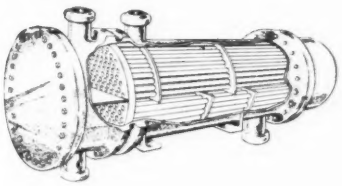

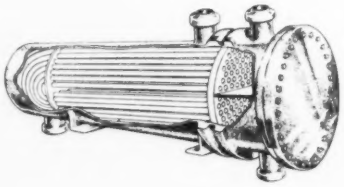

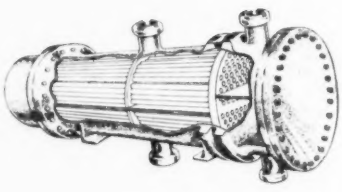

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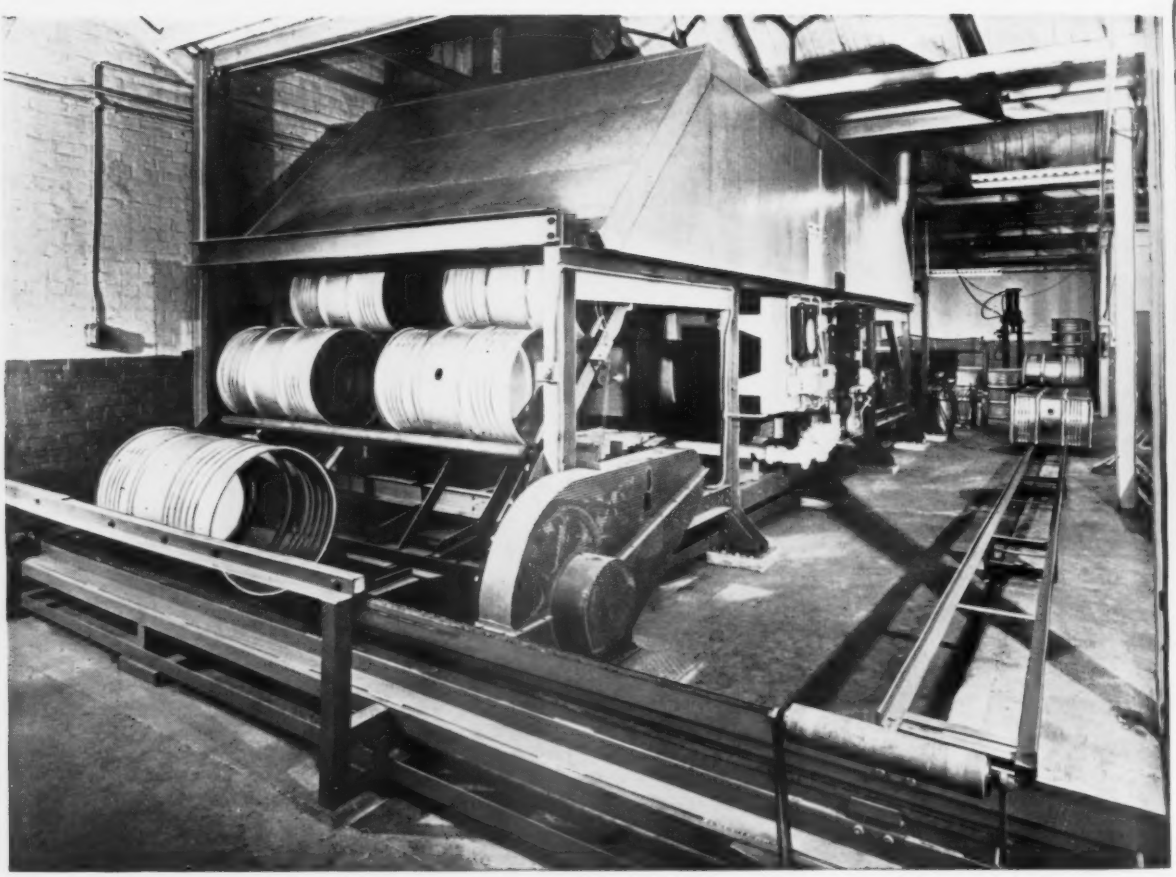

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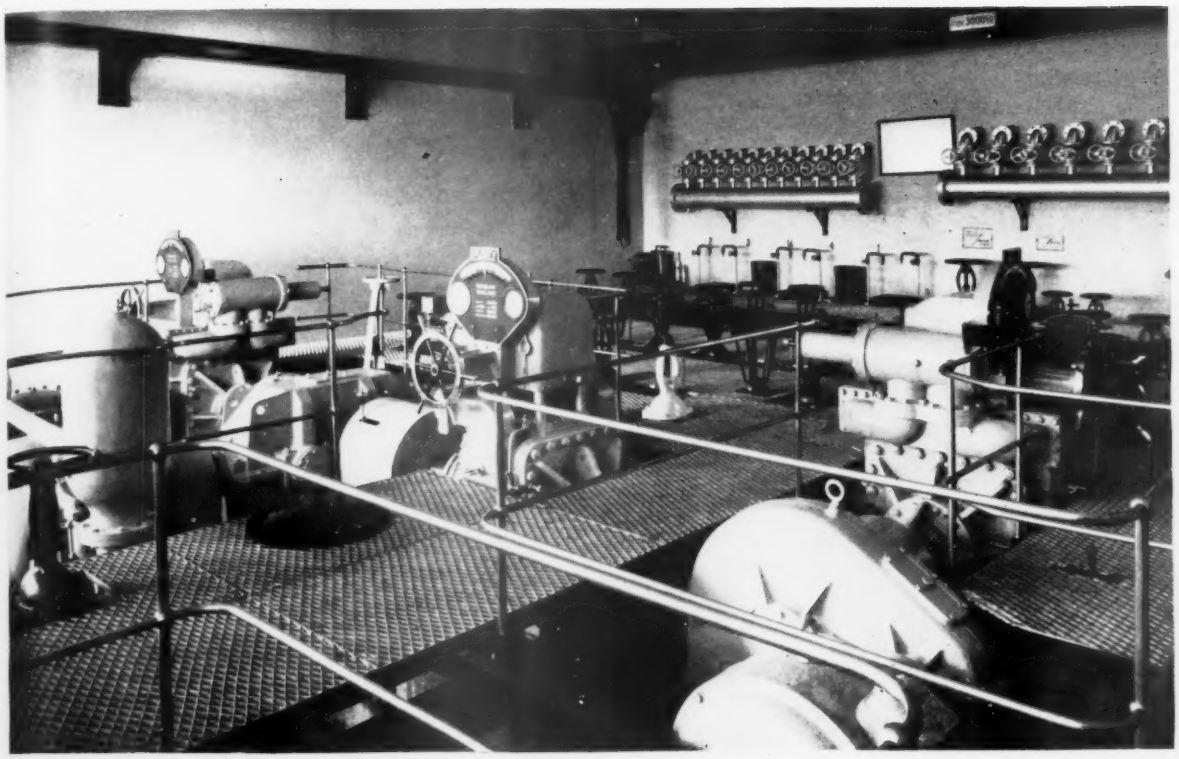

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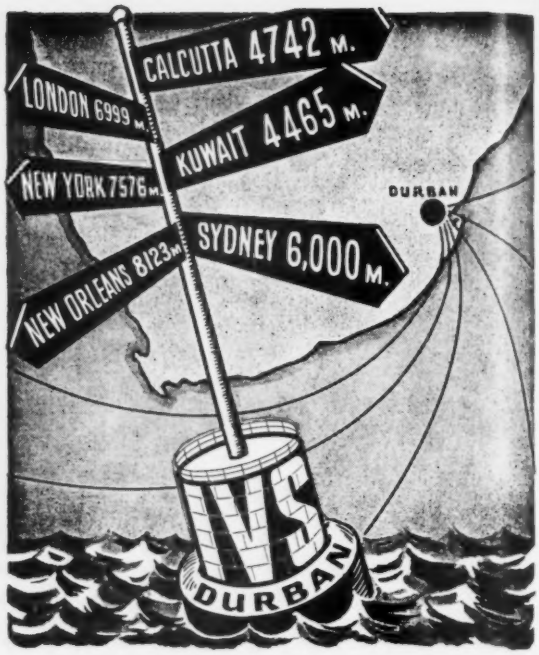

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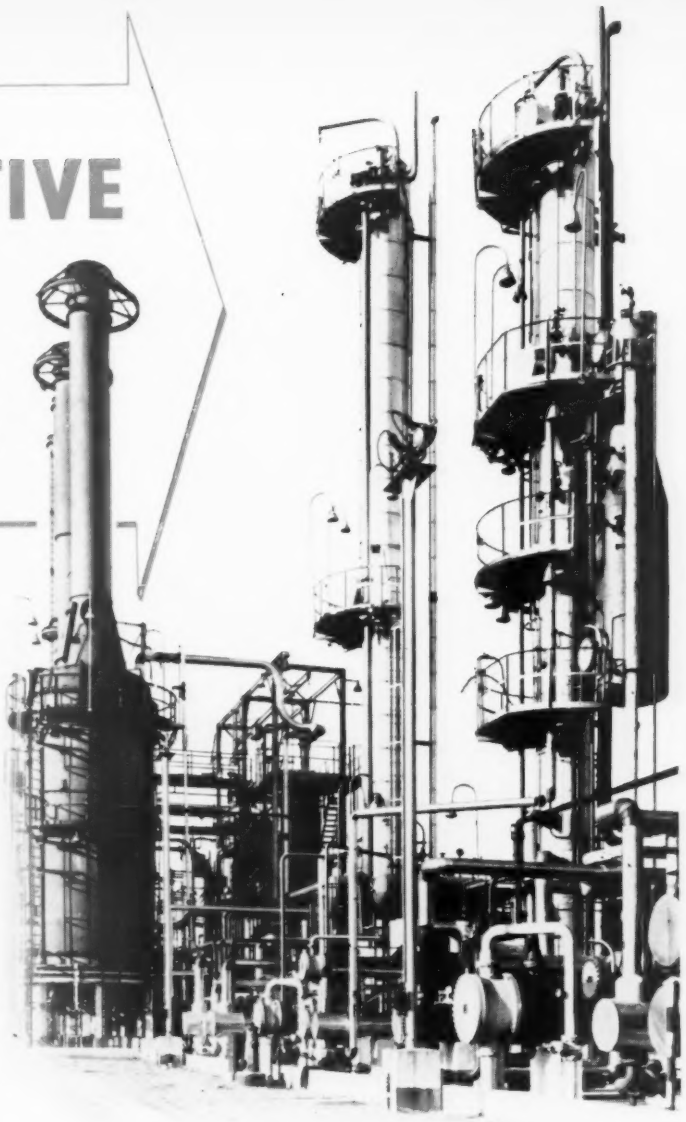
REGENERATIVE CATALYTIC REFORMING



This Kellogg designed desulphurising and catalytic reforming unit, in the Antwerp refinery of Raffinerie Belge de Petroles, S.A., desulphurises 4661 BPSD of straight run naphtha over a Cobalt Molybdate Catalyst in the presence of hydrogen. The heavy fraction of 2500 BPSD is then reformed to an unleaded F-1 octane of 88, whilst the desulphurised light fraction of 2161 BPSD is routed direct to product blending. The process scheme selected permits great flexibility of operation with respect to feedstock and product specifications, and provisions are included in the design for the future production of reformate of up to 95 unleaded F-1 octane. KIC offers the refining industry a wide experience including a background of engineering eight different types of reforming processes in various sizes. Over a third of this experience has been in designing Kellogg reforming units of this type which can produce reformates above 100 F-1 clear octane number. KIC engineers welcome the opportunity to outline to interested refiners the economics and operating details of Kellogg designed Catalytic Reforming Units.

REGENERATIVE CATALYTIC REFORMING DISCOURSE

Mail to me without charge the new Kellogg booklet entitled "REGENERATIVE CATALYTIC REFORMING"

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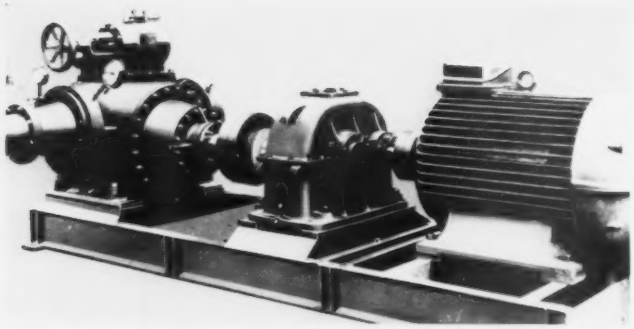

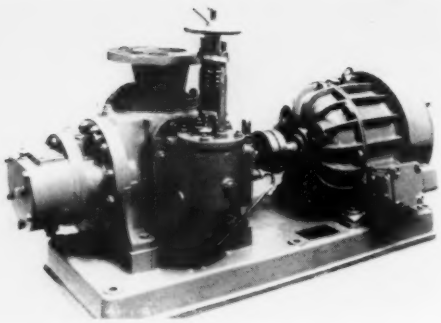

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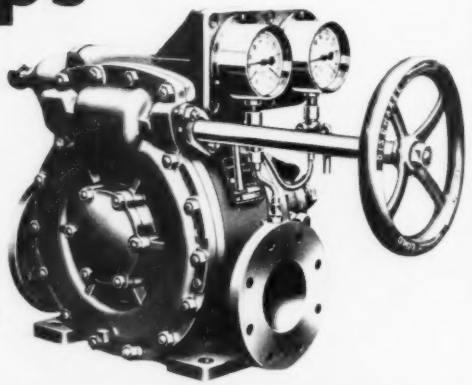
Above left is a Variable Output Rotary Piston Pump. It is almost pulseless and is electrically driven through a reduction gear box.

On the right is a Reversing Flow Rotary Displacement Pump for fitting on tank wagons. It is normally driven from the lorry power take-off.



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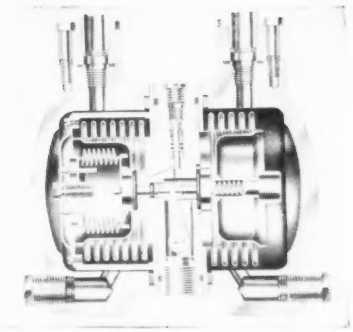

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International NU-SWIFT News

No. 3

HAVE YOU MET THESE PEOPLE?

36. In NASSAU, BAHAMAS, eldorado of all YACHTING AND DEEP-SEA FISHING enthusiasts, many of the YACHTS are equipped with Nu-Swift.

37. PRINCESS BENEDIKTE, teen-age daughter of the King of Denmark, recently launched a large train ferry named after her at ELSINORE close to the legendary home of Hamlet. Required urgently by the DANISH STATE RAILWAYS to cope with increase in cross-water traffic, the ferry was equipped with Nu-Swift.

38. The Trustees of SHAKESPEARE'S Birthplace in STRATFORD-ON-AVON, conscious of the dollar-earning value of the Bard's home, has protected the property with Nu-Swift. Last year the house was visited by over 200,000 sightseers.

39. H.M. THE KING OF SWEDEN has had Nu-Swift fitted in his cars and other vehicles. On board H.S.M.S. "TRE KRONOR", Sweden's premier man-of-war, His Majesty is similarly protected. Three other reigning Sovereigns are also protected on board their yachts by Nu-Swift.

40. ESSO RESEARCH LTD. have equipped their new offices at ABINGDON, BERKS., ENGLAND, with Nu-Swift.

41. The UNITED KINGDOM ATOMIC ENERGY AUTHORITY have protected DOUNREAY EXPERIMENTAL REACTOR ESTABLISHMENT in remote CAITHNESS in the North of Scotland with reliable Nu-Swift. The U.K.A.E.A. has some fire risks: The fire in 1957 at their Windscale No. 1 pile cost £1,967,826.

42. KUNGL. SJÖ FARTSSTYRELSEN, progressive Sweden's Ministry of Transport responsible for safety of life at sea according to the 1948 London Convention, was first maritime authority to approve Nu-Swift 30 lb. Dry Powder Extinguisher, Model 1630, for use afloat. Approval is conditional upon spare charges also being carried.

43. SAS, SCANDINAVIAN AIRLINES SYSTEM, justly renowned for service and efficiency, and "First over the Pole" recently opened their new LONDON headquarters in fashionable Conduit Street. Nu-Swift protects the whole building, from which reservations all over the world can be made in a few minutes, before long further to be accelerated by the installation of electronic equipment.

44. Sir HUGH CASSON, famous British architect and exponent of MODERN DESIGN, is one of the many professional men whose premises are protected by Nu-Swift.

45. Rendez-vous of the cosmopolitan smart set, the famous Palace Hotel, ST. MORITZ, Switzerland, near the Cresta Run, is now protected by Nu-Swift. So are many of the vessels of the rich GREEK SHIPOWNERS who make the Palace Hotel their winter headquarters.

46. Norwegian WHALE CATCHING SHIPS each year set out from SANDEFJORD, Norway, destined for hazardous adventures in ANTARCTICA. Six or nine months later they return after incredible hardship, but often with the pockets of the crew lined with gold. Most whalers and floating whale factories are equipped with reliable Nu-Swift.

HAVE YOU BEEN TO THESE PLACES?

47. In lovely GREENLAND, no longer merely the home of eskimos and a colony but part of the Kingdom of Denmark, with output from cryolite mines becoming of increasing economic importance, trading posts of the ROYAL GREENLAND TRADING CORPORATION have been equipped with Nu-Swift.

48. The HOME OFFICE FORENSIC LABORATORY at PRESTON, LANCS., ENGLAND, famous for its fact-searching work in many murder trials has been equipped with Nu-Swift.

49. Now also available with instructions in ARABIC, Nu-Swift extinguishers can be specified in this and any of 13 OTHER LANGUAGES at no extra charge.

50. PUNCH, the famous weekly, in recent years brightened by a face-lift, is now also, to prevent possible interruption in publication, protected by Nu-Swift. So are the giant presses in the three cities of publication of the DAILY EXPRESS, printed simultaneously every day in 4,000,000 copies, in LONDON, MANCHESTER and GLASGOW.

51. In GUATEMALA, prosperous Central American State, all the BANKS, except one, are protected by reliable Nu-Swift.

52. In the unhappy event of another global war, many CIVIL DEFENCE EXPERTS believe that the self-contained Nu-Swift Universal (Royal Navy) 2-gallon Water Co_2 extinguishers will be of great value in dealing with the many small fires likely to flare up at some distance from a THERMO-NUCLEAR EXPLOSION at a time when public water supplies will probably be interrupted.

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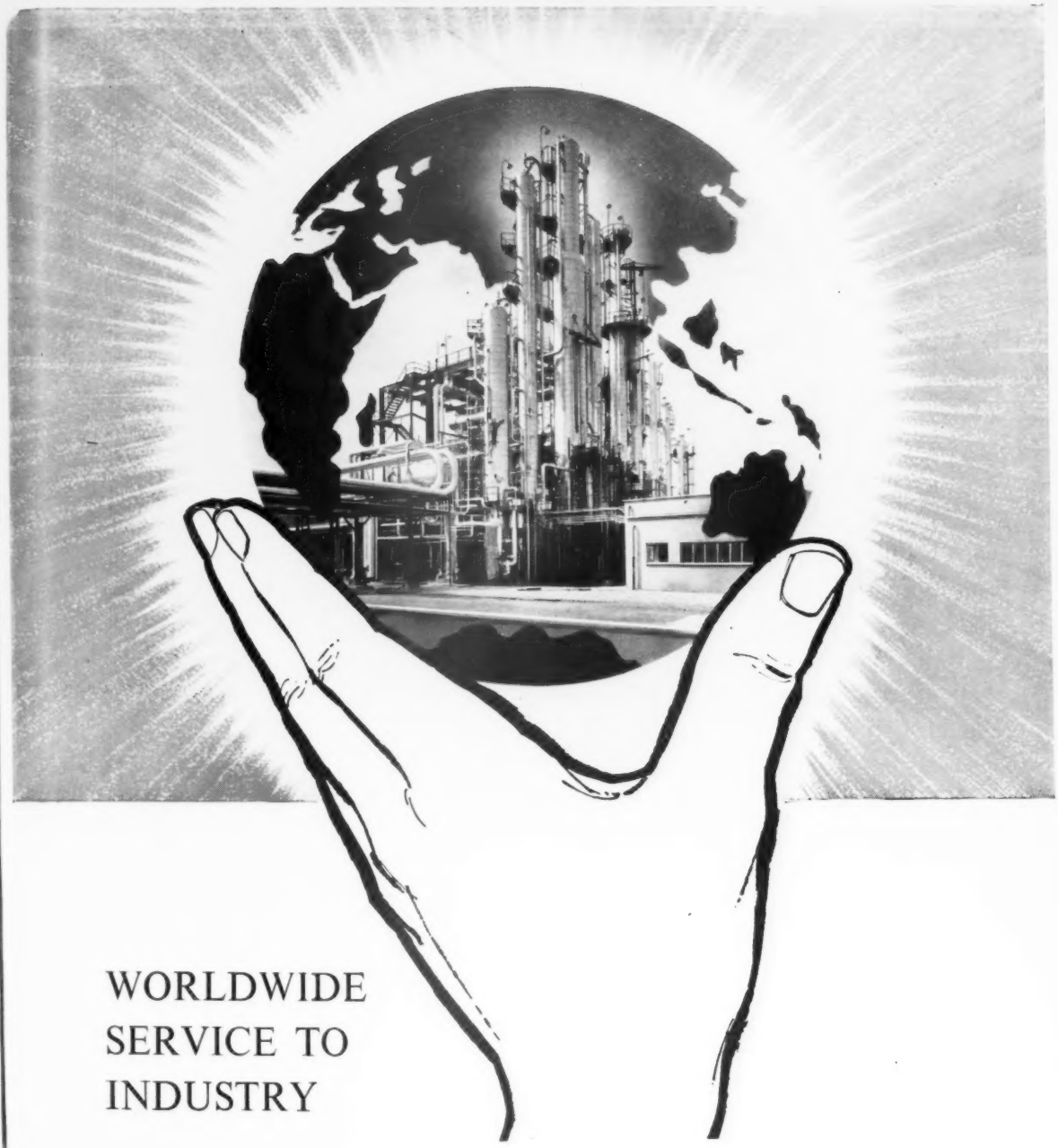

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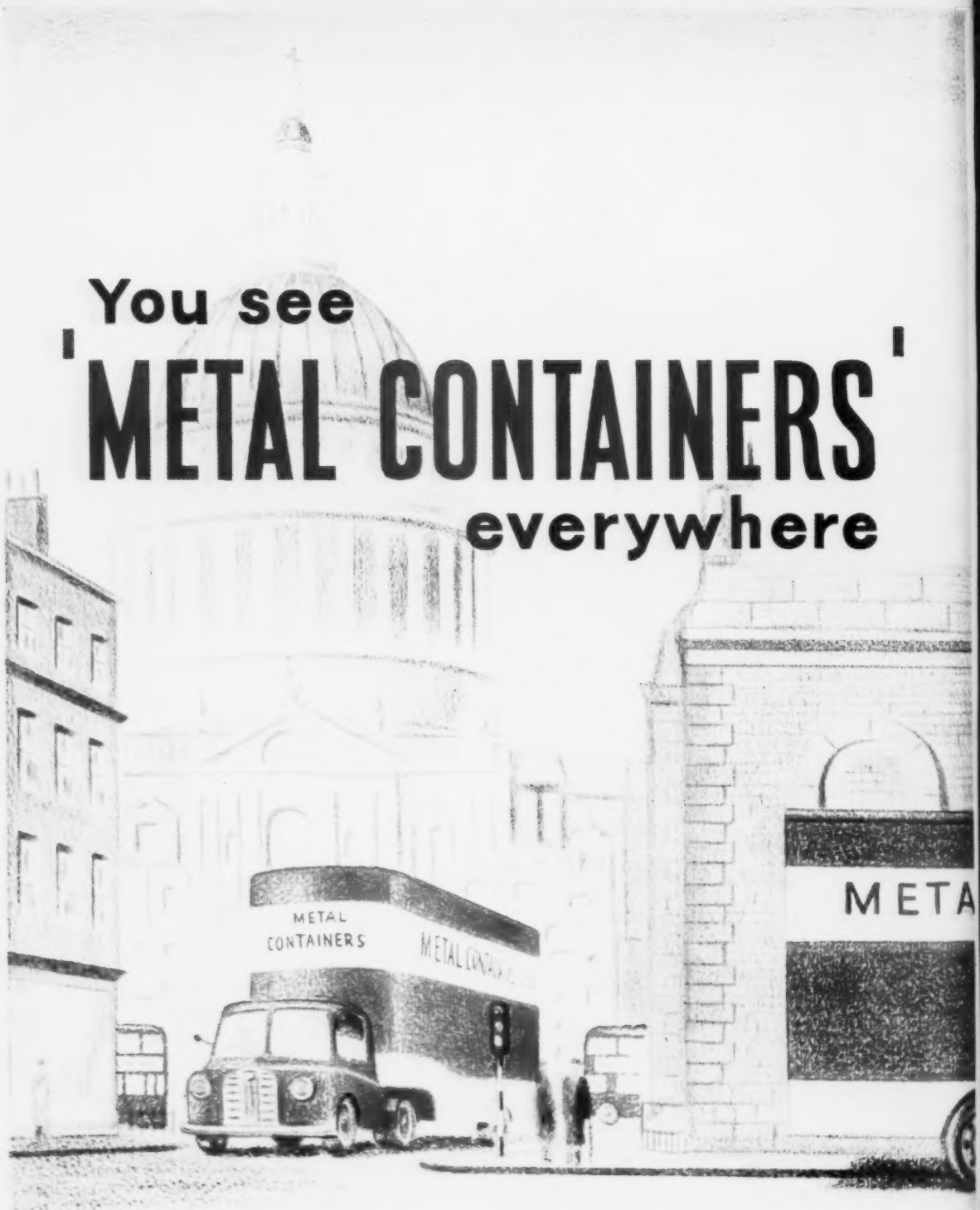

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